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Setup Instructions for the Applied Anomaly Detection Tool (AADT) Web Server

by Christian D Schlesiger

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Setup Instructions for the Applied Anomaly Detection Tool (AADT) Web Server

by Christian D Schlesiger

Computational and Information Sciences Directorate, ARL

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14. ABSTRACT The Applied Anomaly Detection Tool (AADT) is a software application that allows trainers to create and administer courses to teach trainees identification through visual cues of anomalies through imagery. Two versions of the software have been developed by the US Army Research Laboratory (ARL) that deal with 2 different subjects: improvised explosive device signature (IEDS) identification and unmanned aircraft system (UAS) identification. The application allows the trainer to use an ARL-developed course that can be modified to fit individual requirements or create a brand new course, if desired. This tool has been developed for many platforms: Android, iOS, and Windows. The Windows version has been developed as a web server that allows the application to be run through any web browser. This report contains the detailed instructions for setting up that web server on a computer running Microsoft Windows.					
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1. Introduction

The Applied Anomaly Detection Tool (AADT) is a software application that allows trainers to create and administer courses to teach trainees identification through visual cues of anomalies through imagery.¹ Two versions of the software have been developed by the US Army Research Laboratory (ARL) that deal with 2 different subjects: improvised explosive device signature (IEDS) identification and unmanned aircraft system (UAS) identification. The application allows the trainer to use an ARL-developed course that can be modified to fit individual requirements or create a brand new course, if desired.

The core of the IEDS training takes place by showing images where improvised explosive devices (IEDs) may or may not be present and allowing trainees to click on various visual cues or features to see if they indicate the presence of IEDs. The trainer, in creating the course, has marked these images with polygons around the visual cues that should be looked for and provided feedback about these cues as instruction.

The UAS training is a more straightforward slide presentation showing images and videos of UASs along with instructional information about identifying them as groups and individually.

The software has been developed for several different platforms: Android tablets and phones, Apple tables and phones, and computers and tablets running Microsoft Windows. In Microsoft Windows, the AADT application takes the form of a web application running on a web server that is accessed by a web browser. This form is the most flexible, because it can be accessed by any networked device running any operating system that supports Internet connections and a web browser that can display Hypertext Markup Language (HTML). On a standalone Windows system, a web browser can be pointed to the local web server on that same computer system and still use the software as a web application.

The instructions contained in this report apply to setting up the web server application on a Microsoft Windows computer. It has been tested on a server running Windows Server 2012, a laptop running Windows 8 Pro, and Microsoft Surface Pro tablets running Windows 10 Pro. It is expected that these instructions will only deviate slightly, if at all, if applied to other hardware as long as Microsoft Windows 8 or later, or Windows Server 2012 or later, is used.

With these steps, one sets up a database in Microsoft Structured Query Language (SQL) Express, sets up the Internet Information Service (IIS), and copies over the web server files to the proper location. The instructions include steps to copy over

all the installation files to a recovery folder. Should the need arise to reinstall the application, an Internet connection will not be as necessary, since it can be carried out with the contents of this recovery folder.

2. Requirements

These instructions assume a working knowledge of Microsoft Windows and control panel applets, administrator privileges for the login used for these instructions on the computer to be installed on, and an active Internet connection.

It is also assumed that the computer is connected to the Battlefield Information Processing Branch (BIPB) RDENet network and is able to access certain network locations to retrieve the AADT databases and web server files. If this is not the case, then the software can be acquired from BIPB through separate means and accessed that way.

3. Install IIS

IIS is the Microsoft Windows application that allows a computer to act as a web server. On most Windows systems, it is not installed by default. These instructions set up that feature so it is possible to host a web application on the server.

- 1) Launch the control panel application and go to Programs->Programs and Features->Turn windows features on or off (Fig. 1).

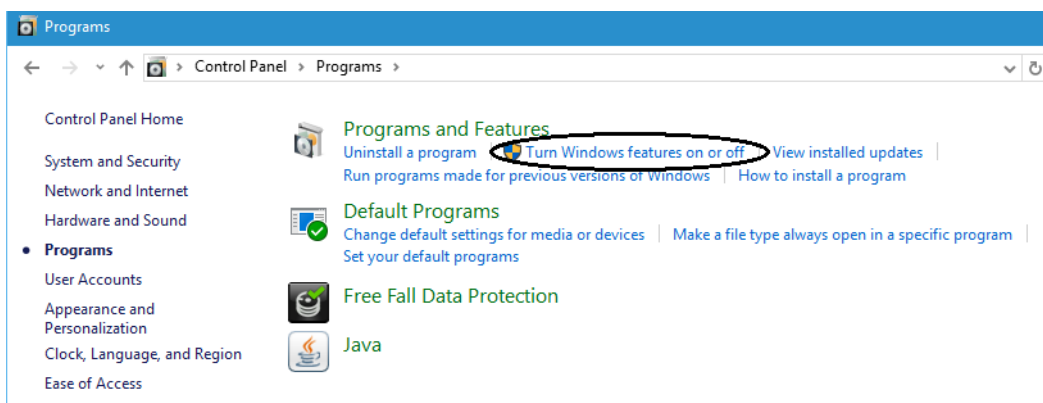


Fig. 1 Control panel programs and features

- 2) A new window launches with a tree view of features to select from (Fig. 2).

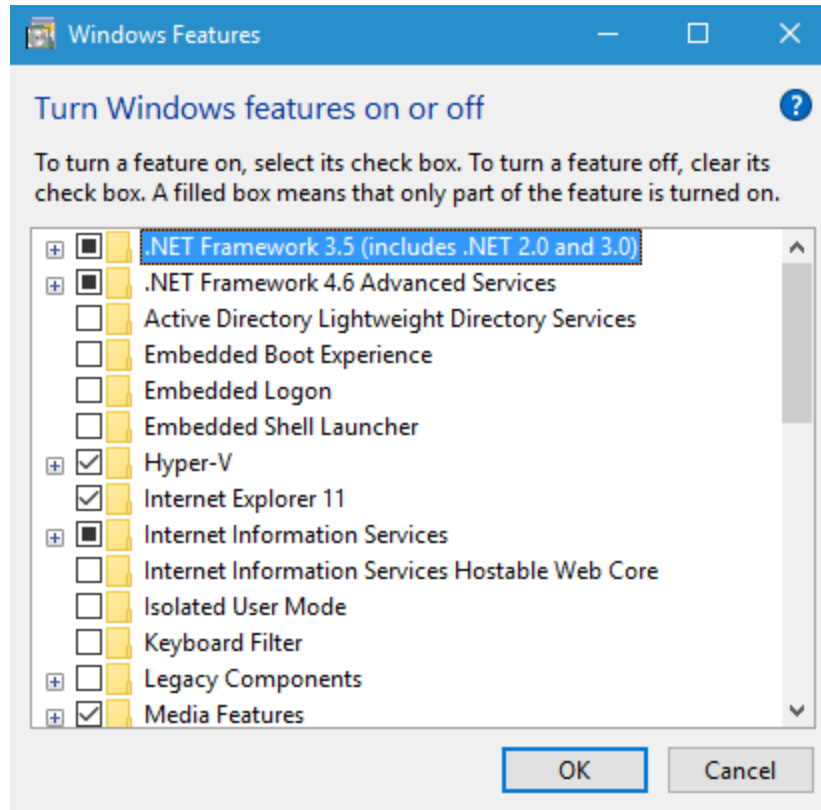


Fig. 2 Turn Windows features on or off

- 3) Scroll down to **Internet Information Services**. If the checkbox next to the yellow folder is not filled, click the checkbox to fill it. It should fill with a small black square indicating a partial install. Defaults are fine with one exception, described in the next step.
- 4) Expand that folder, then expand the subfolder **World Wide Web Services**. Then expand **Application Development Features**. Scroll down to **CGI** and check that box (Fig. 3).

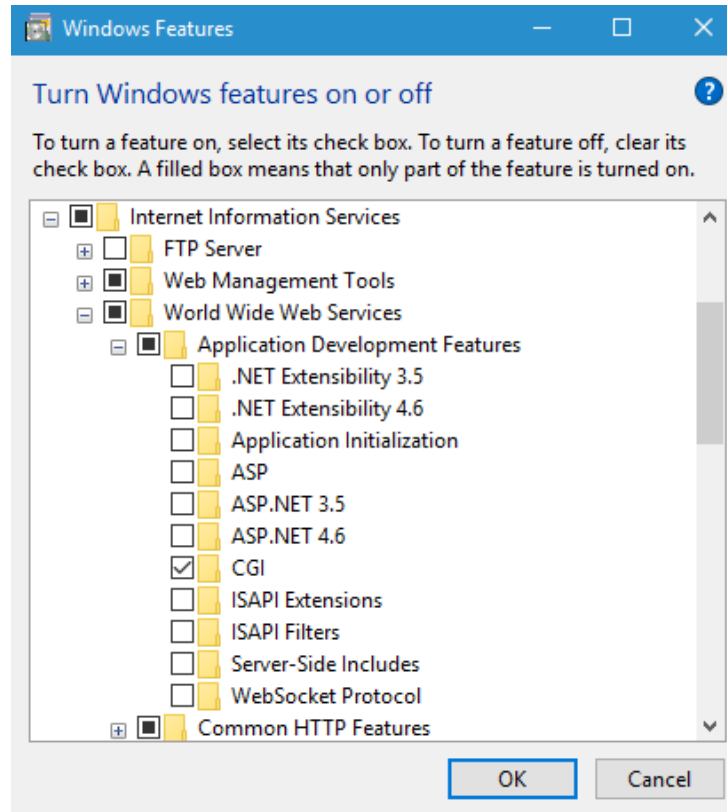


Fig. 3 Turn on IIS features

5. Click on **OK** and let windows install the features.

4. Install SQL Express

Microsoft SQL Express is a free application for accessing databases. The AADT IEDS and UAS applications both use databases to store the courses and the trainee information and course results.

- 1) Download the SQL Express 2016 installer from Microsoft. It is a free application and download at this URL:

<https://www.microsoft.com/en-us/download/details.aspx?id=52679>

- 2) On the page, click on the Download button.
- 3) Move the downloaded file *SQLServer2016-SSEI-Expr.exe* from the default Downloads folder to the following location for reinstall and recovery. This folder will need to be created:

C:\Application Installs\Microsoft SQL Server Express

- 4) From its new location, launch the file *SQLServer2016-SSEI-Expr.exe*. On the installation type, select the **Basic** installation type and follow the wizard using defaults (Fig. 4).

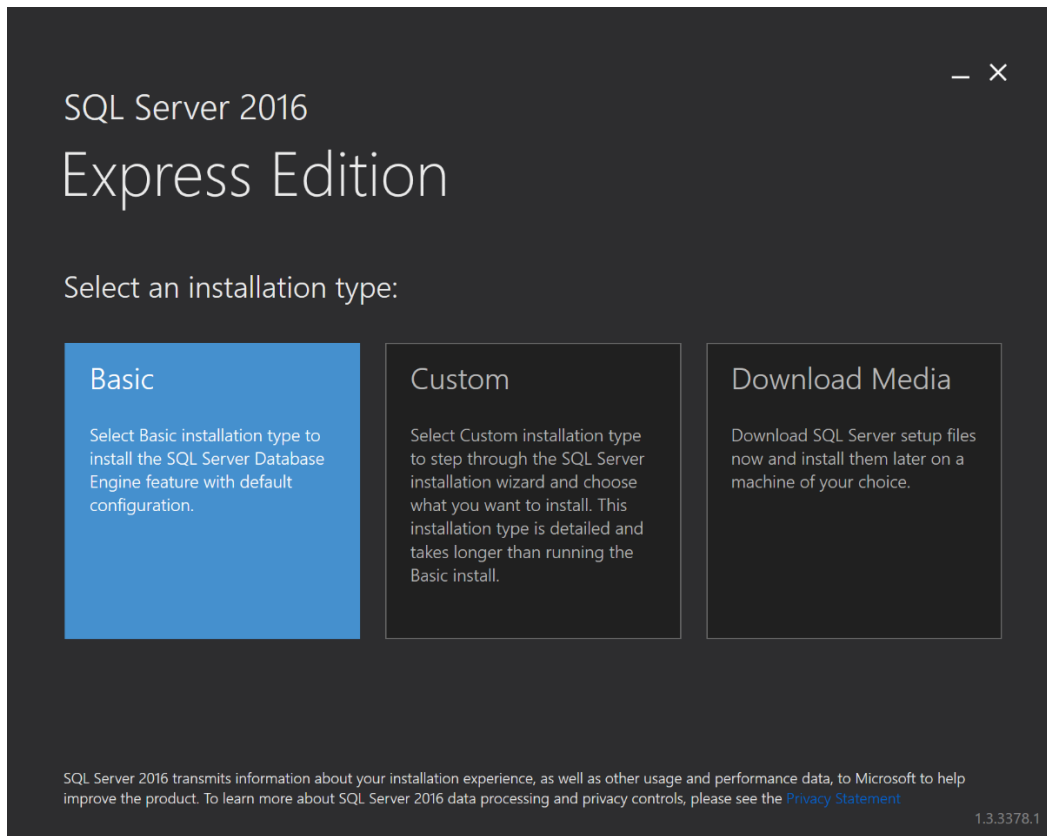


Fig. 4 SQL Server Express installation types

- 5) At the end of the wizard's install, click on the **Close** button.

5. Install SQL Server Management Studio

Microsoft SQL Server Management Studio is a free application that allows administration and access to databases running in Microsoft SQL Server.

- 1) Download the SQL Server Management studio installer from Microsoft at this URL:
<https://msdn.microsoft.com/en-us/library/mt238290.aspx>
- 2) Click on the link under **Download SQL Server Management Studio (SSMS)**. This will download the installer for the application at its latest revision.

- 3) Move the downloaded file *SSMS-Setup-ENU.exe* from the default Downloads folder to the following location for reinstall and recovery. The folder will need to be created:

C:\Application Installs\Microsoft SQL Server Management Studio

- 4) From its new location, launch the file *SSMS-Setup-ENU.exe* and follow the wizard for a default install.
- 5) Close the installation wizard when it is complete.

6. Install Visual C++ Redistributable 2012

The Visual C++ Redistributable 2012 is a runtime library necessary to run applications developed under the Microsoft .NET Framework, version 4.5. The PHP scripting language parser that is installed requires this redistributable to be in place.

- 1) Download the Visual C++ Redistributable 2012 from Microsoft. It is a free download at this URL:

<https://www.microsoft.com/en-us/download/details.aspx?id=30679>

- 2) Click on the **Download** button,, which opens a new page with choices of downloads (Fig. 5). Check the boxes next to both of the following:

- VSU_4\vc_redist_x64.exe
- VSU_4\vc_redist_x86.exe

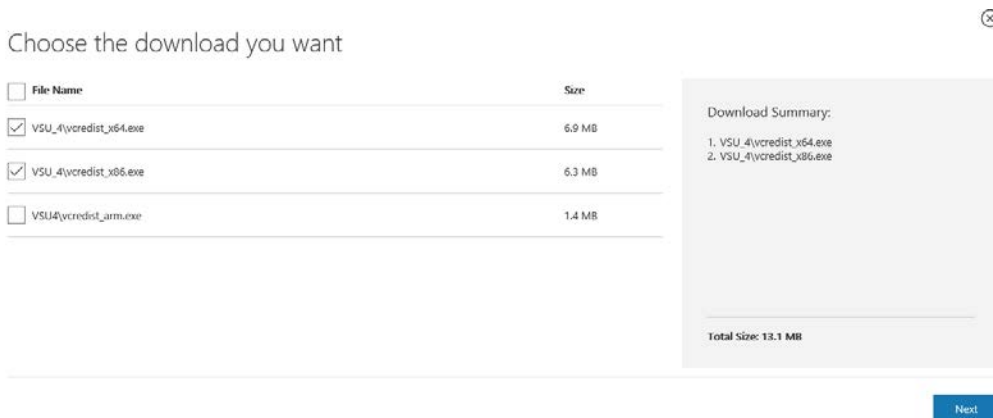


Fig. 5 Downloading the Visual C++ Redistributable 2012

- 3) Then click **Next** to complete the download.

- 4) Move both of the downloaded files named above from the default Downloads folder to the following location for reinstall and recovery. The folder will need to be created:

`C:\Application Installs\Microsoft Visual C++ Redistributable 2012`

- 5) Launch each of the executables in turn to get them installed, using the default settings.

7. Install Web Platform Installer 5.0

The Microsoft Web Platform installer is an application to manage smaller applications needed for web development and deployment.

- 1) Download the Web Platform Installer from Microsoft. Another free application at this URL:

<https://www.microsoft.com/web/downloads/platform.aspx>

- 2) Click on the **Free Download** button to download the application.
- 3) Move the downloaded file *wpilauncher.exe* from the default Downloads folder to the following location for reinstall and recovery. The folder will need to be created:

`C:\Application Installs\Microsoft Web Platform Installer`

- 4) From its new location above, launch the file *wpilauncher.exe*. This is a fast install and it will run the Web Platform Installer after it is complete. Leave the window open for now as it will be used in the next section.

8. Install PHP for IIS

PHP is a scripting language that is used throughout the AADT web application. A PHP parser needs to be installed into IIS so that the application will run properly.

- 1) Launch the Web Platform installer (look for it under All Apps under “W”), if it is not already running from the previous section (Fig. 6).

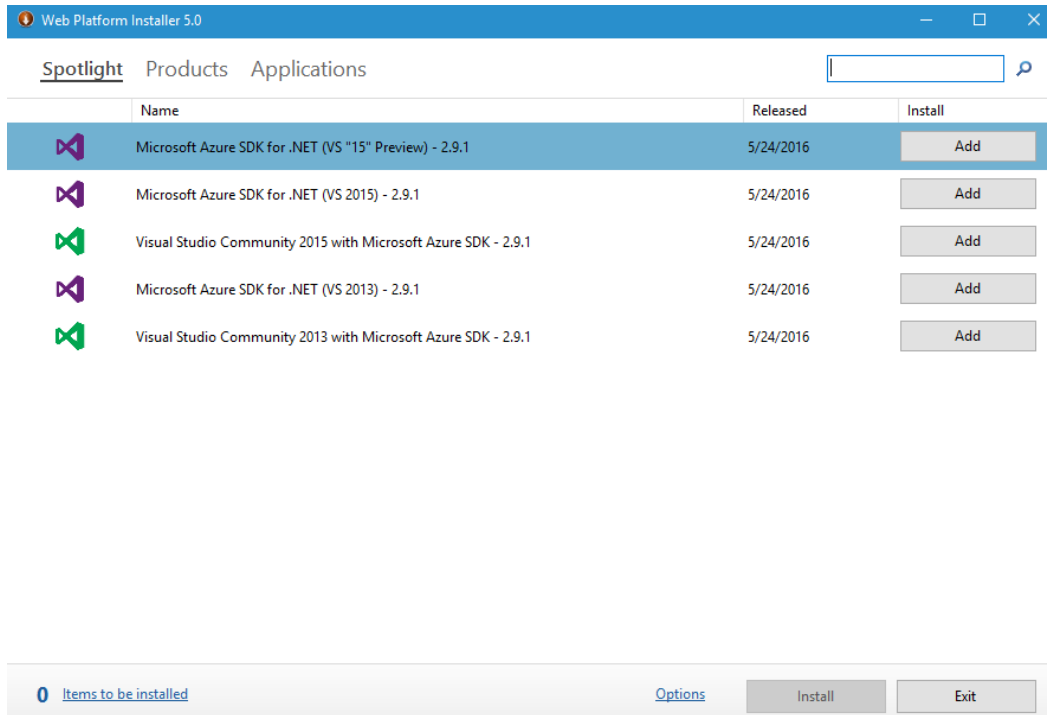


Fig. 6 Microsoft Web Platform Installer at startup

- Along the top, click on **Products**. Leave **All** highlighted on the left-hand panel that now appears (Fig. 7).

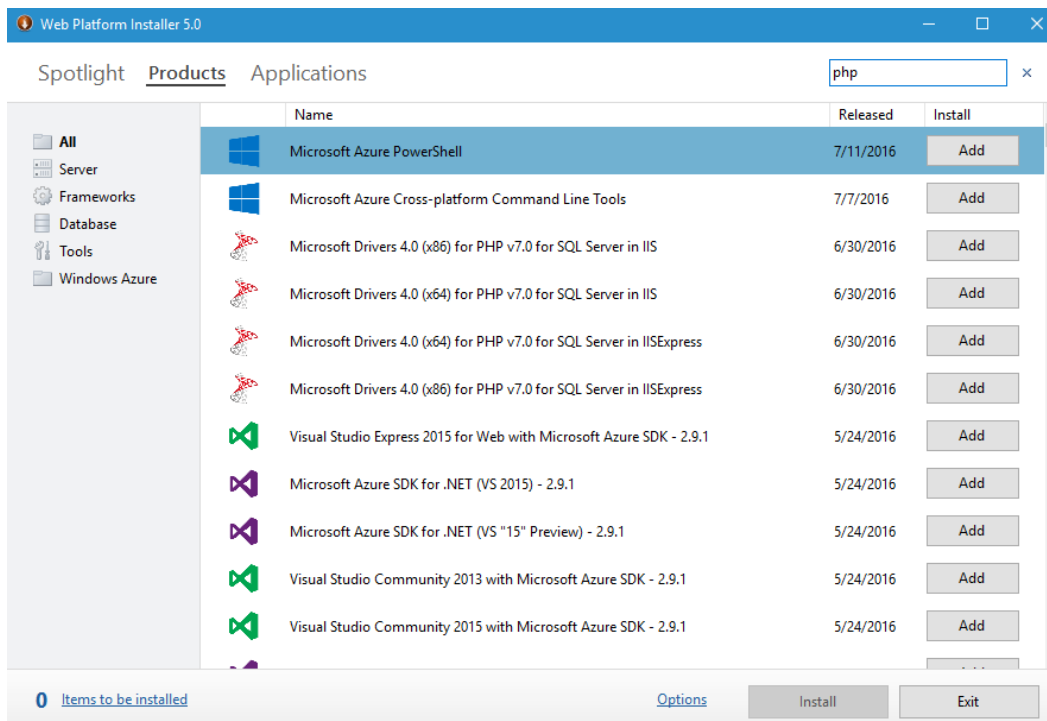


Fig. 7 Web Platform Installer at the Products page

- 3) In the search window on the top right, type “php” and hit Enter to initiate the search.
- 4) Scroll down the products to locate: “Microsoft Drivers 3.2 for PHP v5.6 for SQL Server in IIS”. Select it, then click on the **Add** button next to it (Fig. 8).

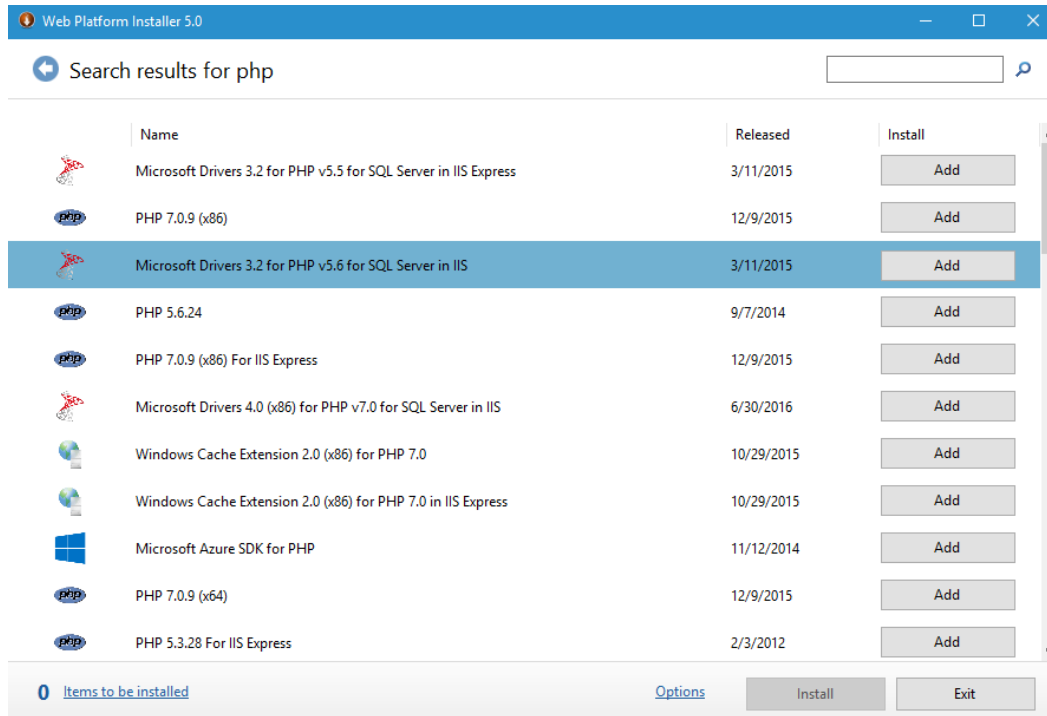


Fig. 8 Web Platform Installer search results for PHP

- 5) Then click on the **Install** button at the bottom of the window to install it.
- 6) Click on “I Accept” on the confirmation dialog. Installation will commence.
- 7) Close the Web Platform Installer by clicking **Exit** after the installation is complete.
- 8) Open up a Windows Explorer window, and navigate to the following folder to verify that PHP was installed properly to its default location:

C:\Program Files (x86)\PHP\v5.6

9. Verify PHP is in the Path

In some cases, the PHP installation does not go cleanly. This procedure verifies that it was added to the path environment variable correctly.

- 1) Launch the control panel application. Go to System->System and Security->System.
- 2) Click on “Advanced system settings” on the left (Fig. 9).

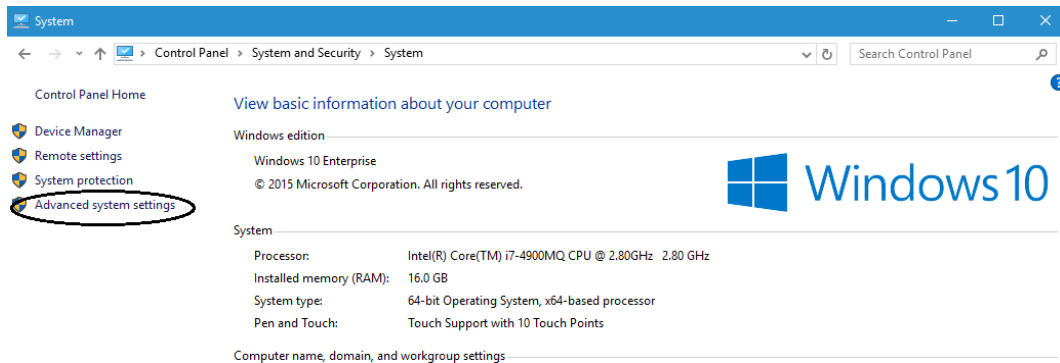


Fig. 9 Control panel advanced system settings

- 3) On the new window that pops up, the “Advanced” tab is selected. Click on the “Environment Variables...” button at the bottom right (Fig. 10).

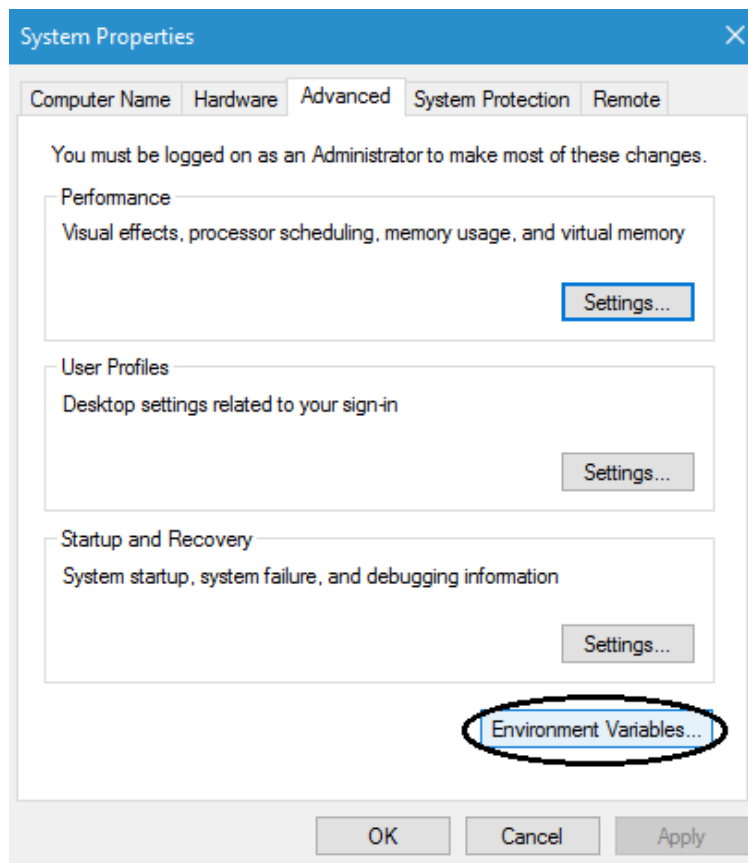


Fig. 10 System Properties Environment Variables

- 4) Another window appears. In the bottom list scroll down to “Path”, then click it to highlight it. Click on the “Edit...” button (Fig. 11).

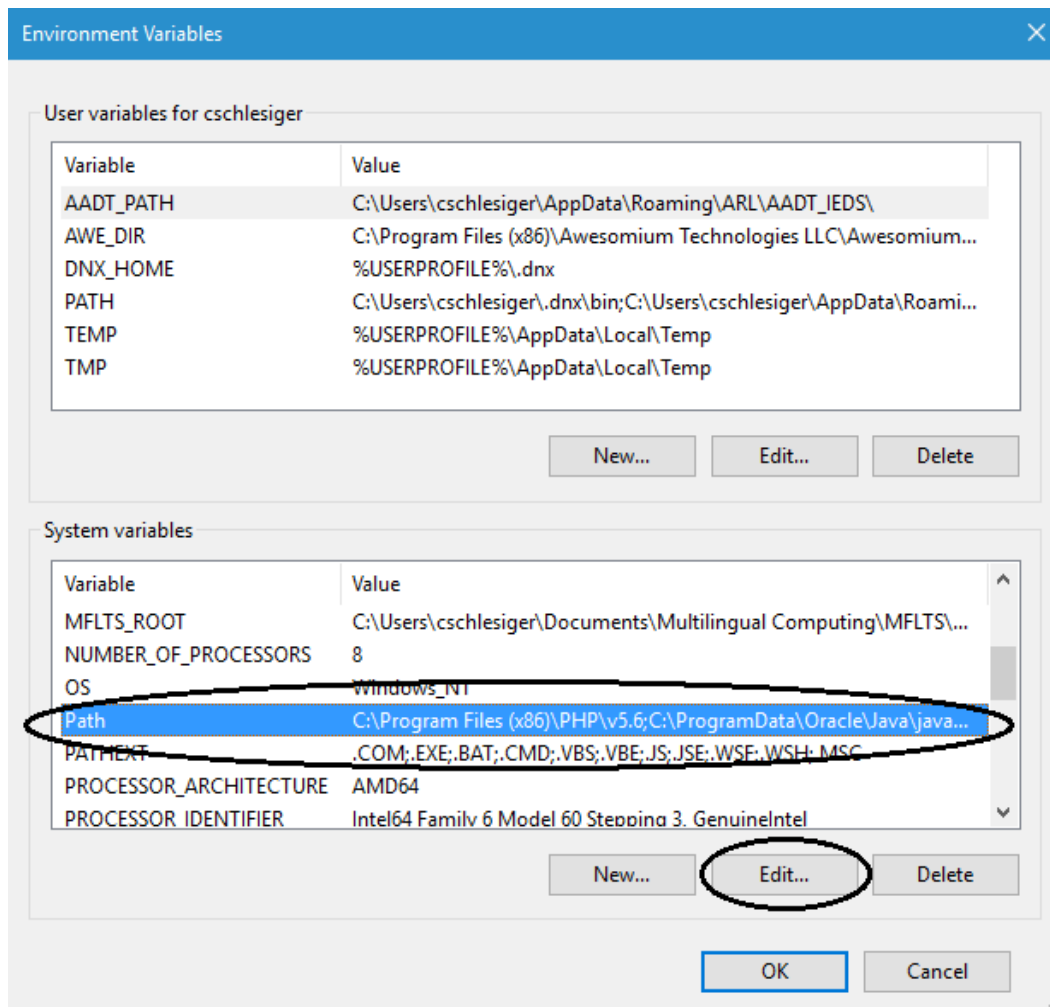


Fig. 11 Selecting the Path environment variable for editing

- 5) Look for the entry “C:\Program Files (x86)\PHP\v5.6”. It should be the top entry. Look for it elsewhere if it is not there. If it is not there at all, make a new entry by clicking on the **New** button, typing in the path as above, and then clicking on **Move Up** to move it up to the top of the list (Fig. 12).

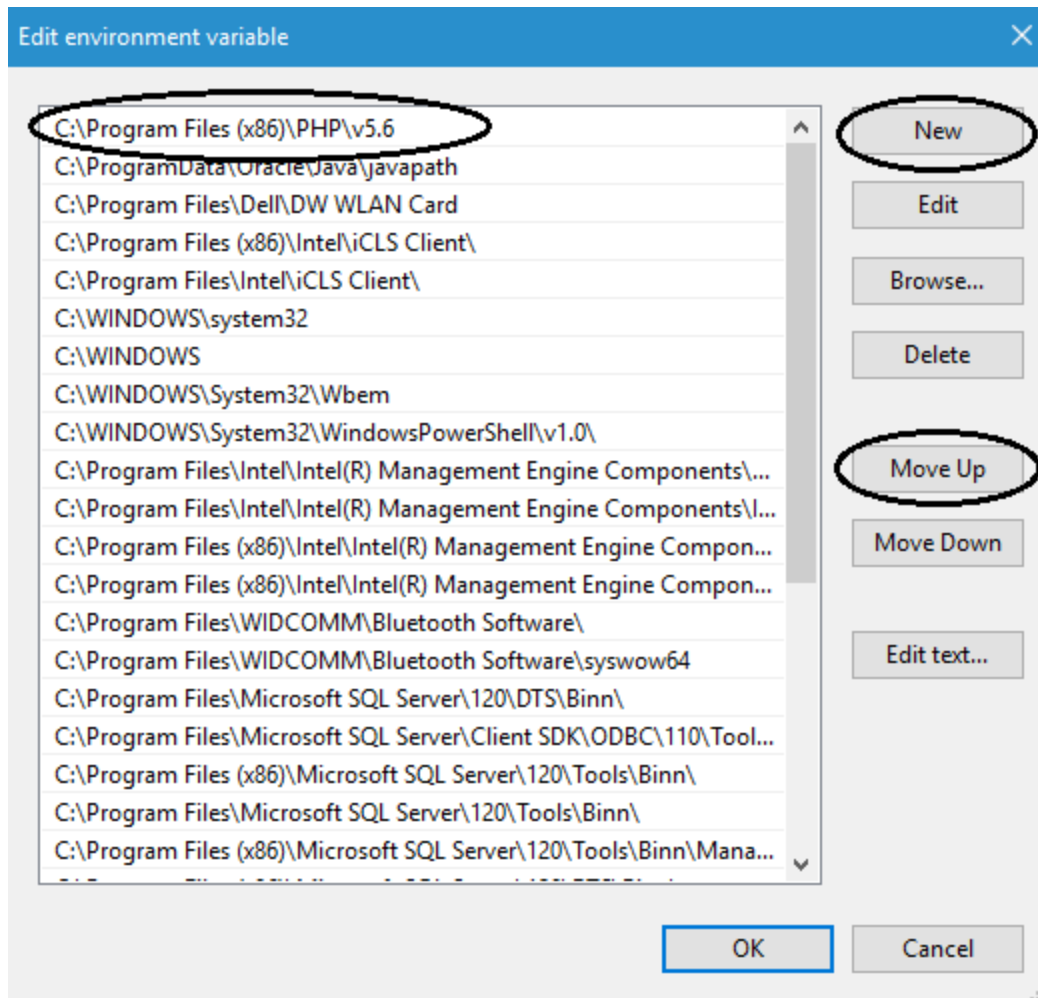


Fig. 12 Verifying and creating a new path environment variable entry

- 6) Click on **OK** to apply the changes and close all the previous windows until you return to the main Control Panel window.

10. Verify PHP is working

This next step verifies that the PHP scripting parser has been installed and is working properly.

- 1) Bring up a command prompt (run cmd from the taskbar search window).
- 2) Type “php -v”. This response should appear:

```
PHP 5.6.20 (cli) (built: Mar 31 2016 14:56:41)
Copyright © 1997-2016 The PHP Group
Zend Engine v2.6.0, Copyright © 1998-2016 Zend Technologies
```


- 3) If there is an error about a missing dynamic-link library (DLL) instead, make sure that both the x86 and the x64 version of the Visual C++ Redistributable 2012 files have been installed as per the previous section.
- 4) Exit the command prompt by closing the window or typing “exit”.

11. Setup the Databases

The AADT application for IEDS and UAS both require its own database. This section copies the database file backups to the recovery folder then installs them into SQL Server Express.

- 1) Locate the backup database files for the IEDS and UAS applications. They are on the network drive at

```
\\SynologyNAS\root\public\cschlesiger\AADT Web Setup\Databases
```

If this is a reinstall, then they are located in the following folder:

```
C:\Application Installs\AADT Databases
```

There should be 2 files:

- AADT-IED-02242016.bak
- AADT-UAS-02242016.bak

- 2) Copy these files to the folder recovery folder if they are not already there. This folder will need to be created:

```
C:\Application Installs\AADT Databases
```

- 3) Launch Microsoft SQL Server Management Studio. This application is located on the Start Menu under the All apps\Microsoft SQL Server 2016 folder.
- 4) At the login prompt, the default server name is display and it should be in the form: <computer>\SQLEXPRESS where <computer> is the computer name. Click on **Connect** (Fig. 13).

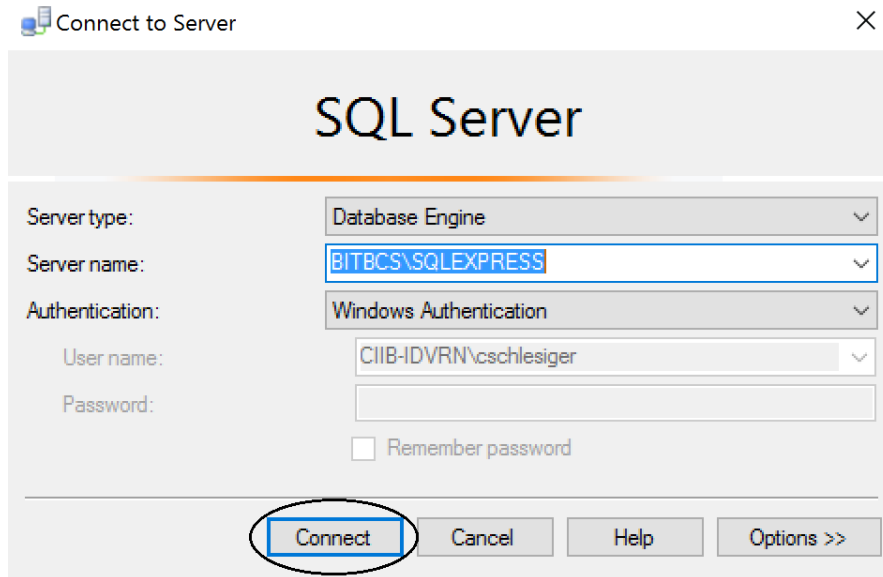


Fig. 13 Connect to SQL Server Express

- 5) On the left pane, expand the top-level tree and locate the Databases folder. Right click and, on the context menu, select “Restore Database...” (Fig. 14).

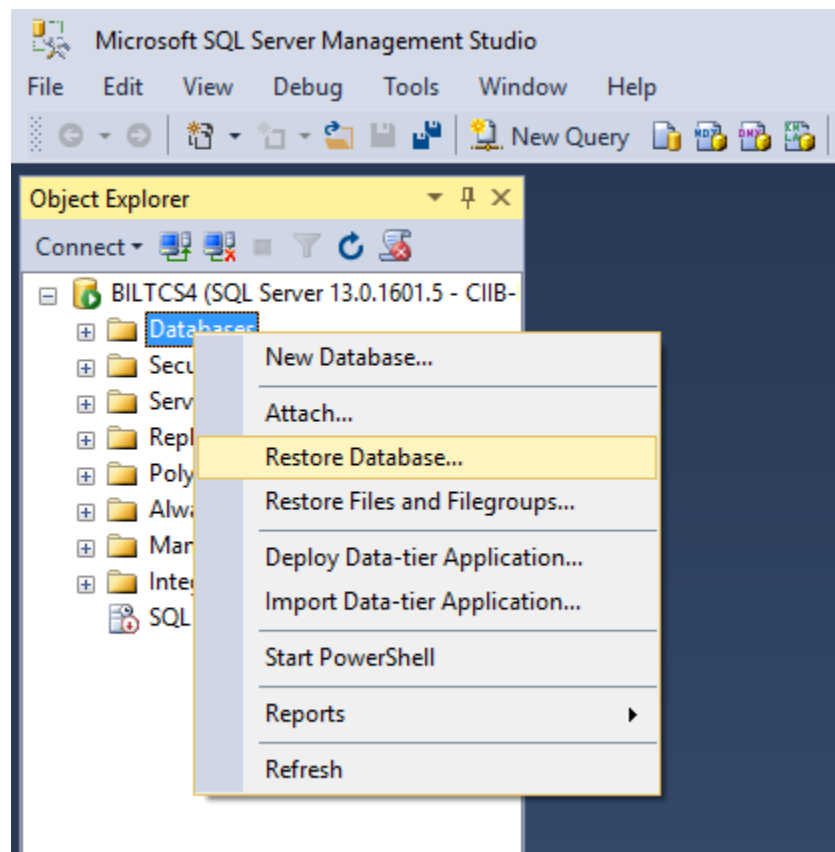


Fig. 14 SQL Server Management Studio Database Restore context menu

- 6) On the new window that appears, on the main pane change Source to “Device”. Then click on the button with the ellipsis “...” to the right of the blank Device selection (Fig. 15).

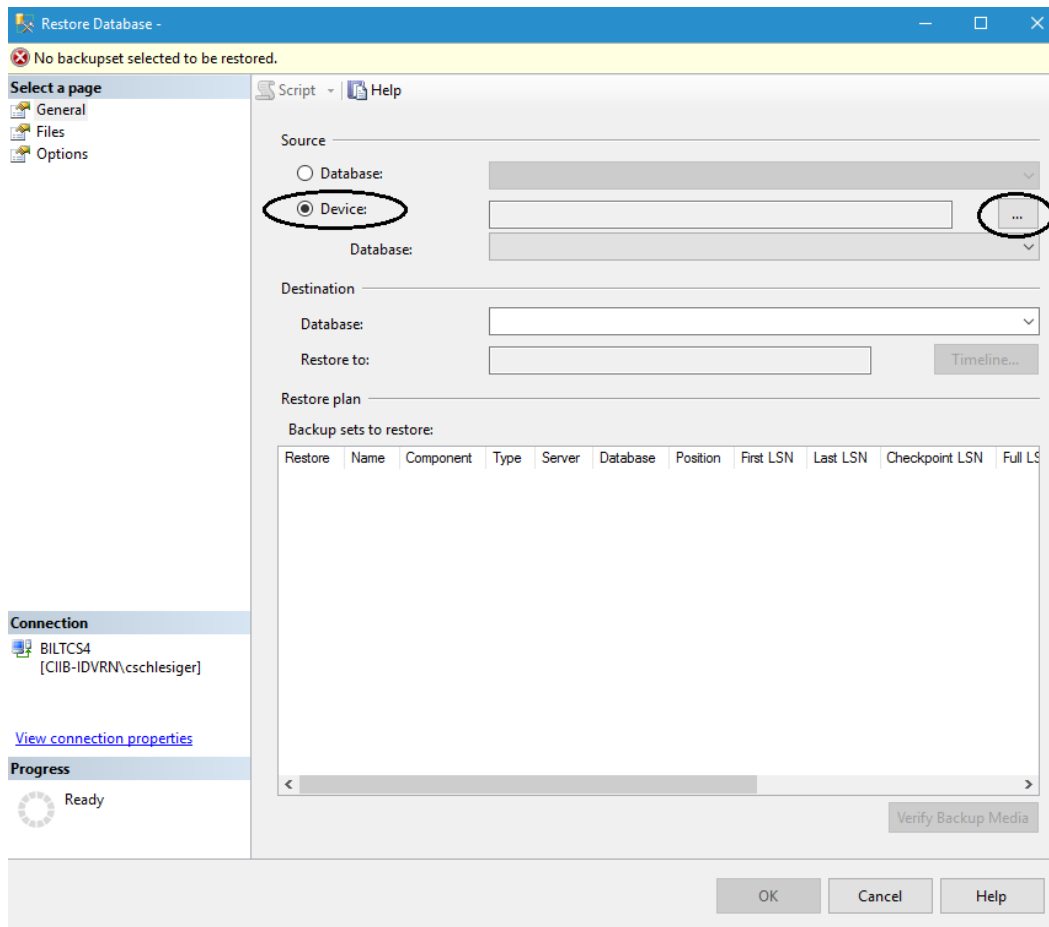


Fig. 15 Restore database Device selection

- 7) On this next window, leave Backup media type as “File”. Click on the **Add** button (Fig. 16).

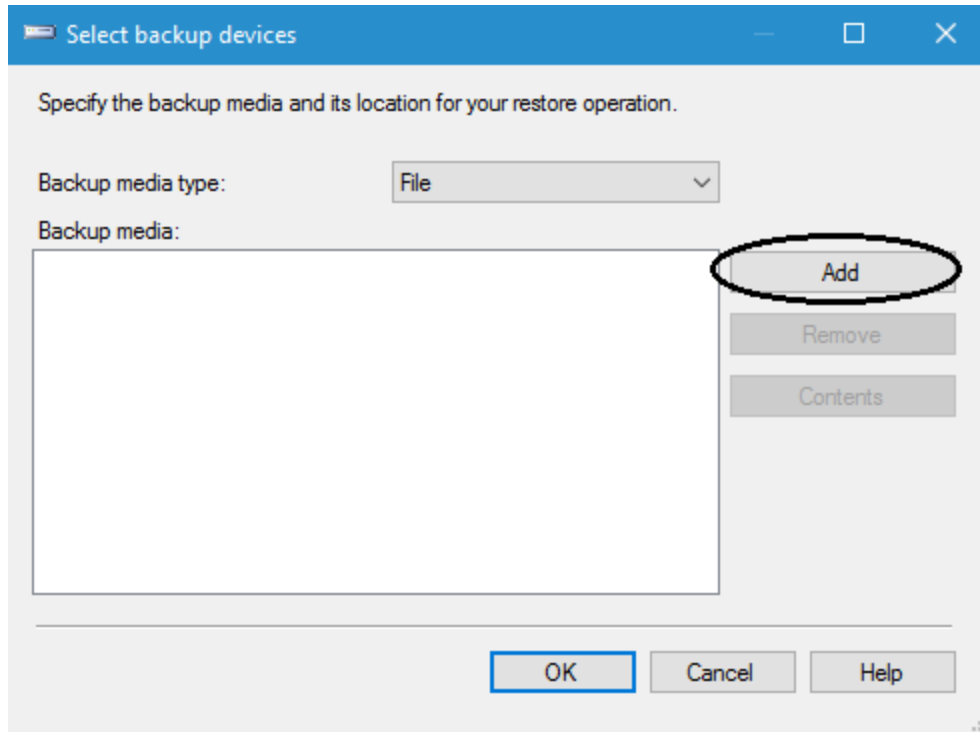


Fig. 16 Restore database select backup devices window

- 8) This opens up another window titled “Locate Backup File”. Navigate to the following folder:

`C:\Application Installs\AADT Databases`

Select the folder and select the first file *AADT_IED_02242016.bak*. Then click **OK**.

- 9) The “Select backup devices” window should show the database file location in the main window under “Backup media”. Click on **OK**.
- 10) This returns the user to the “Restore Database” window (Fig. 17).

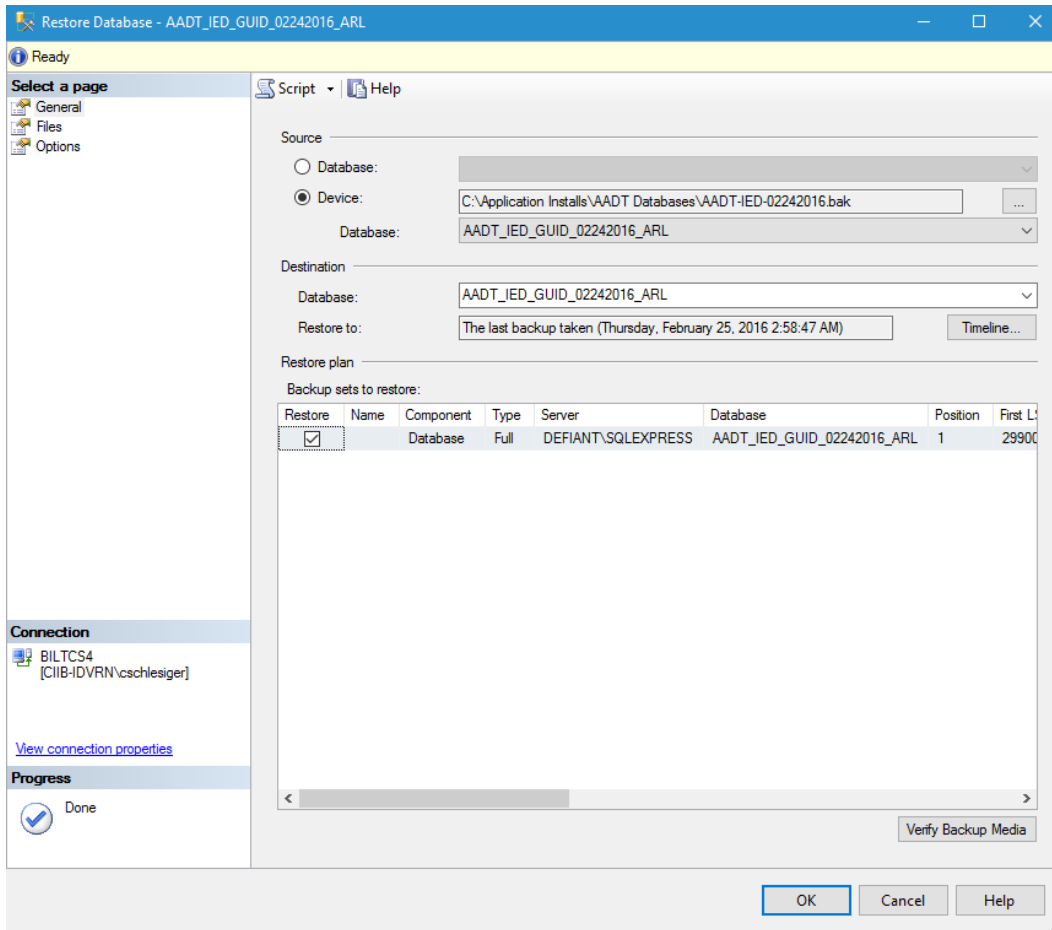


Fig. 17 Restore Database with database selected

- 11) On the left pane, navigate to the “Files” page where it says “Select a page”.
- 12) On the main pane, check the box that says “Relocate all files to folder” (Fig. 18).

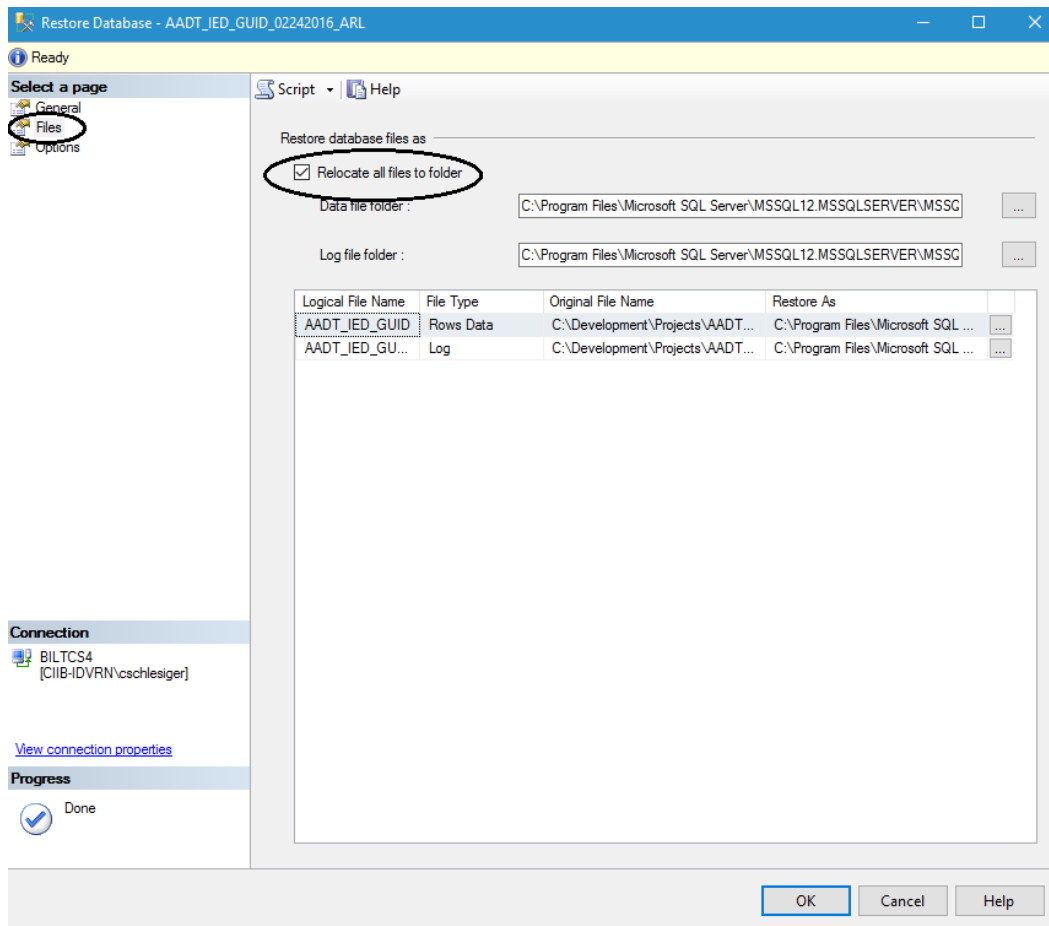


Fig. 18 Restore database Files page with relocation box checked

- 13) Click on **OK** to begin the restore process.
- 14) Repeat steps 5–13 for the *AADT_UAS_02242016.bak* database.
- 15) Verify that the 2 new databases appear in the left pane “Object Explorer” under the “Databases” folder. One may have to click on the Refresh button to see them (Fig. 19).

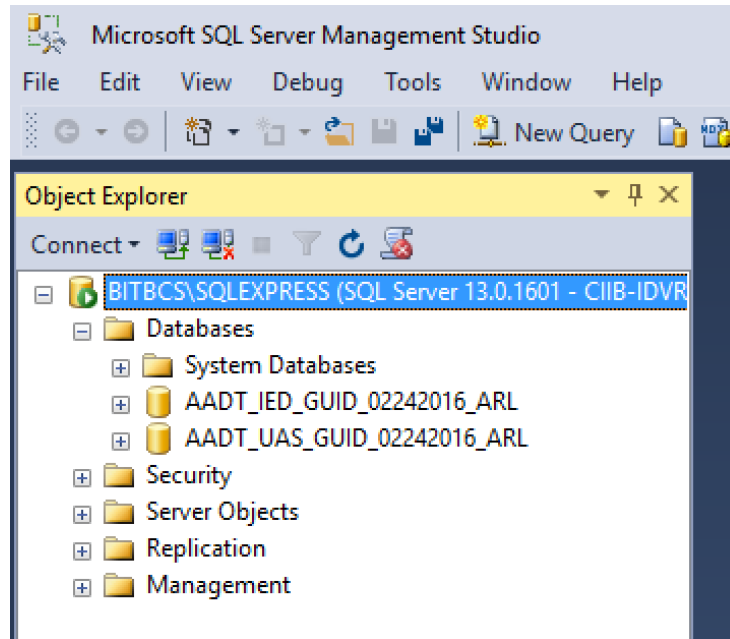


Fig. 19 Databases installed into SQL Server Express, displayed with Management Studio

12. Setup IIS Access to the Databases

IIS runs under a dedicated user account. It is necessary to grant access to the databases for this account. This is a security feature for IIS to prevent unauthorized access on the server hosting the web application.

- 1) Launch Microsoft SQL Server Management Studio and connect as before if it is not already open.
- 2) On the left pane "Object Explorer", expand the tree on the "Security" folder.
- 3) Expand the tree under the "Logins" folder.
- 4) Right click on the "Logins" folder and on the context menu that appears select "New Login..." (Fig. 20).

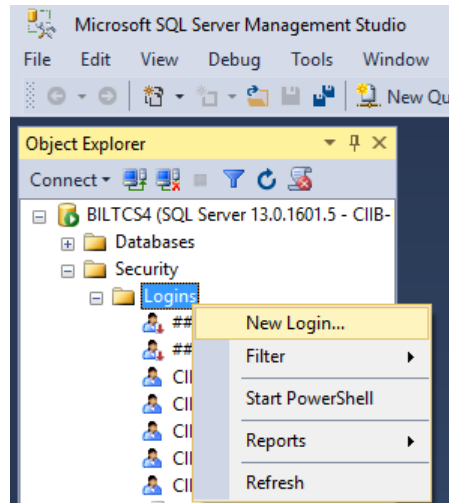


Fig. 20 Creating a new Login for SQL Server Express

- 5) On the main pane at the top is a “Login name:” field, which is blank. To the right of that, click the “Search...” button (Fig. 21).

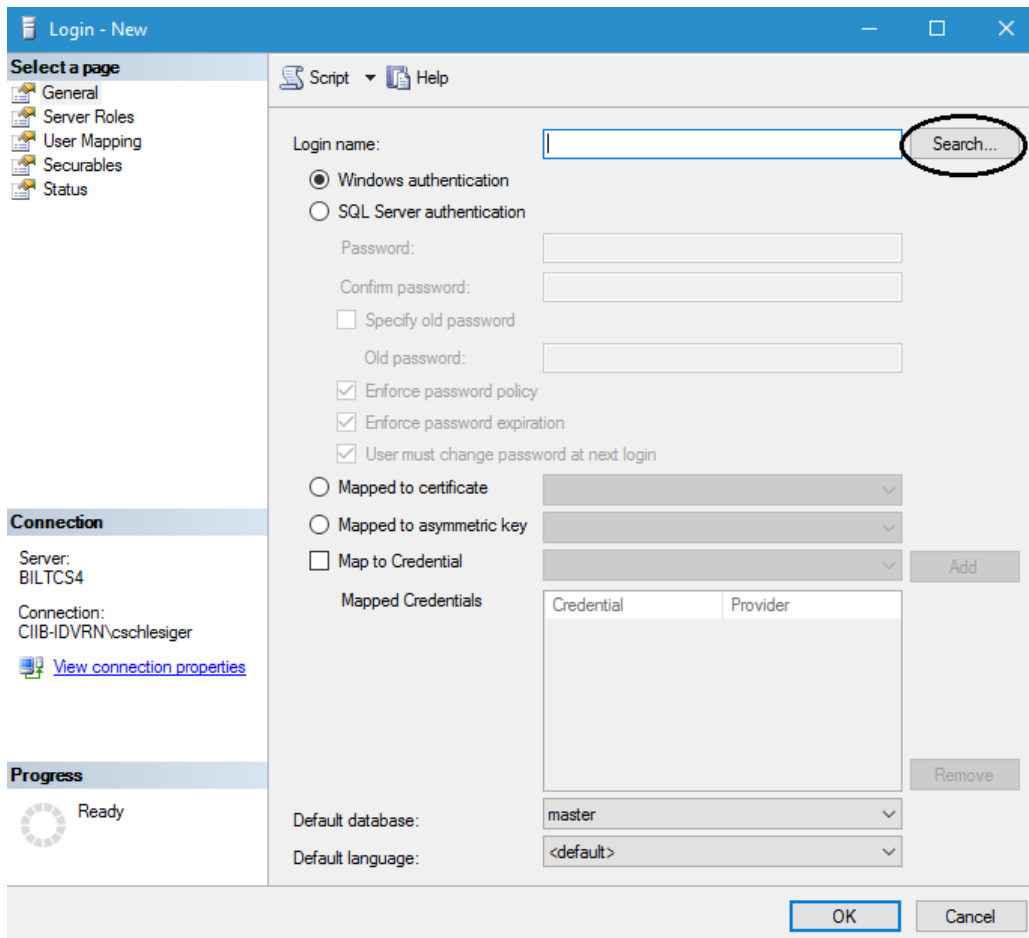


Fig. 21 New Login creation window in SQL Server Management Studio

- 6) On the new window that appears, type “IUSR” in the box “Enter the object name to select”. Then click on the “Check Names” button (Fig. 22). The “IUSR” in the box should become underlined. Click on **OK** to close this window.

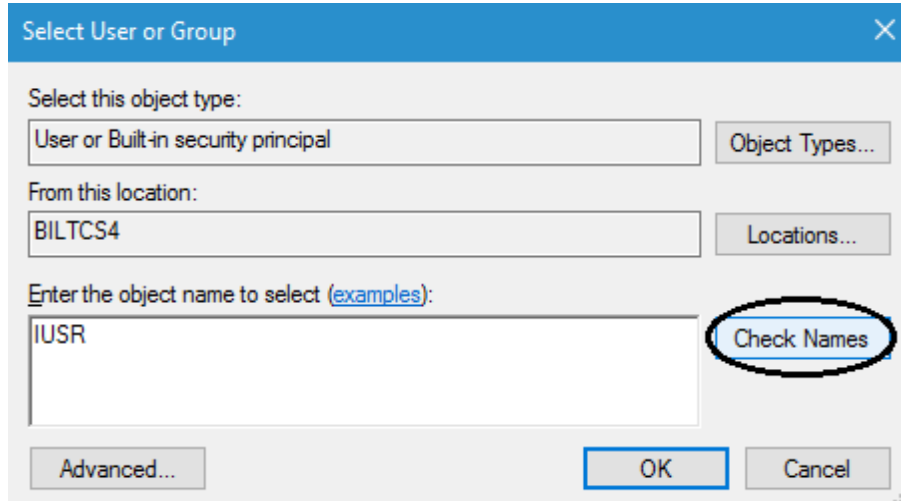


Fig. 22 Searching for a Windows Authenticated User

- 7) The “Login name:” field on the “Login – New” window should now be filled with “NT AUTHORITY\IUSR” (Fig. 23).

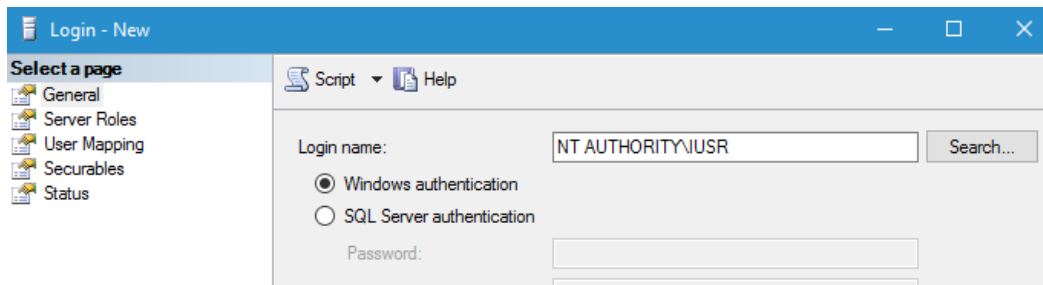


Fig. 23 New Login name filled

- 8) Click on **OK** to close the window and create the user.
- 9) Return to the Object Explorer in the left-hand pane and refresh the tree under “Logins”.
- 10) Locate the new user NT AUTHORITY\IUSR and select it. Right-click and select “Properties” on the context menu that appears (Fig. 24).

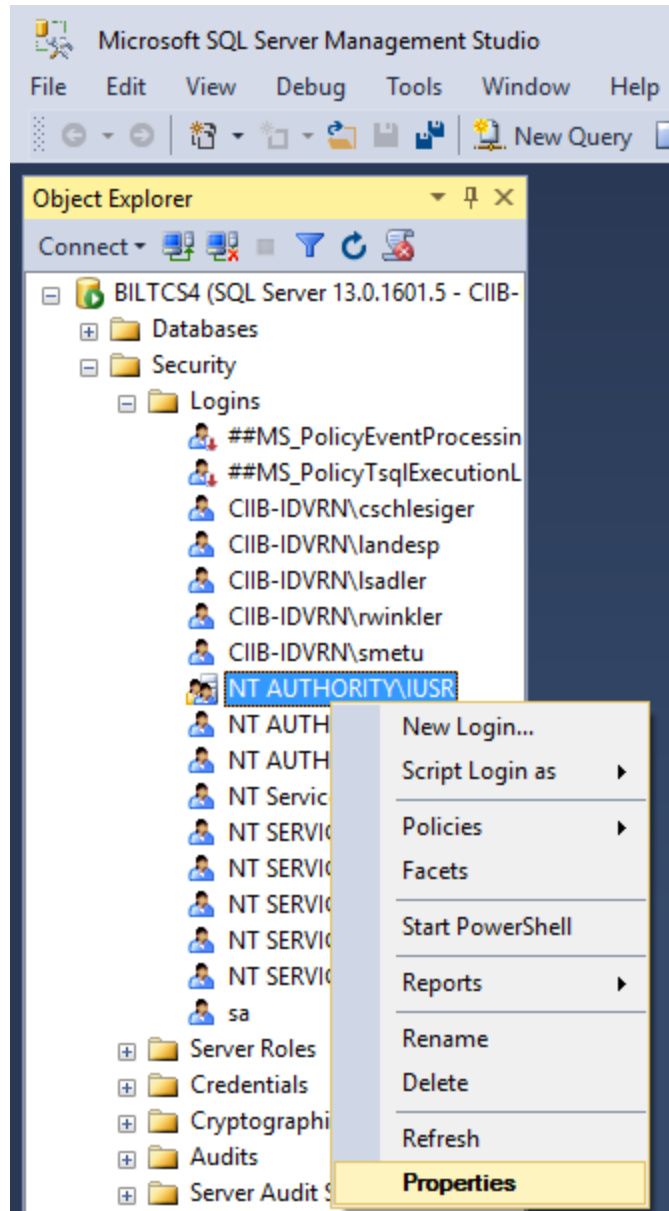


Fig. 24 Editing properties of the NT AUTHORITY\IUSR login

- 11) The window that appears will look identical to the New Login window, but instead this is editing the properties of the currently selected user.
- 12) At the bottom of the main pane is a field “Default database:” Click on the drop-down menu and change it from “master” to the following (Fig. 25):
 “AADT_IED_GUID_02242016_ARL”.

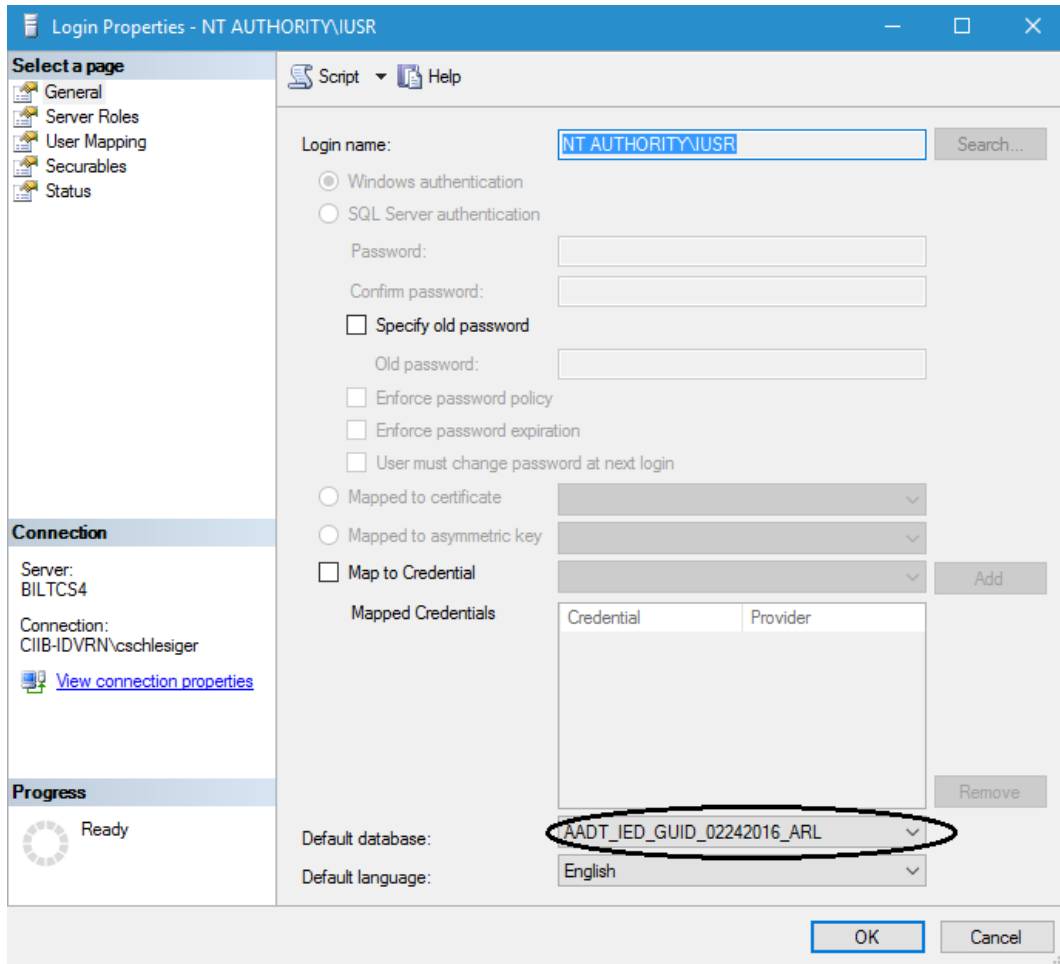


Fig. 25 Setting the default database for the login

- 13) On the left pane, navigate to the “User Mapping” page.
- 14) On the main pane, under the top list titled “Users mapped to this login:” select the row with “AADT_IED_GUID_02242016_ARL” and check the box.
- 15) On the bottom list titled “Database role membership for:” the title should now be followed by “AADT_IED_GUID_02242016_ARL”. In the list box, check the boxes next to the following:
 - db_datareader
 - db_datawriter
 - The checkbox next to “public” should already be checked (Fig. 26).

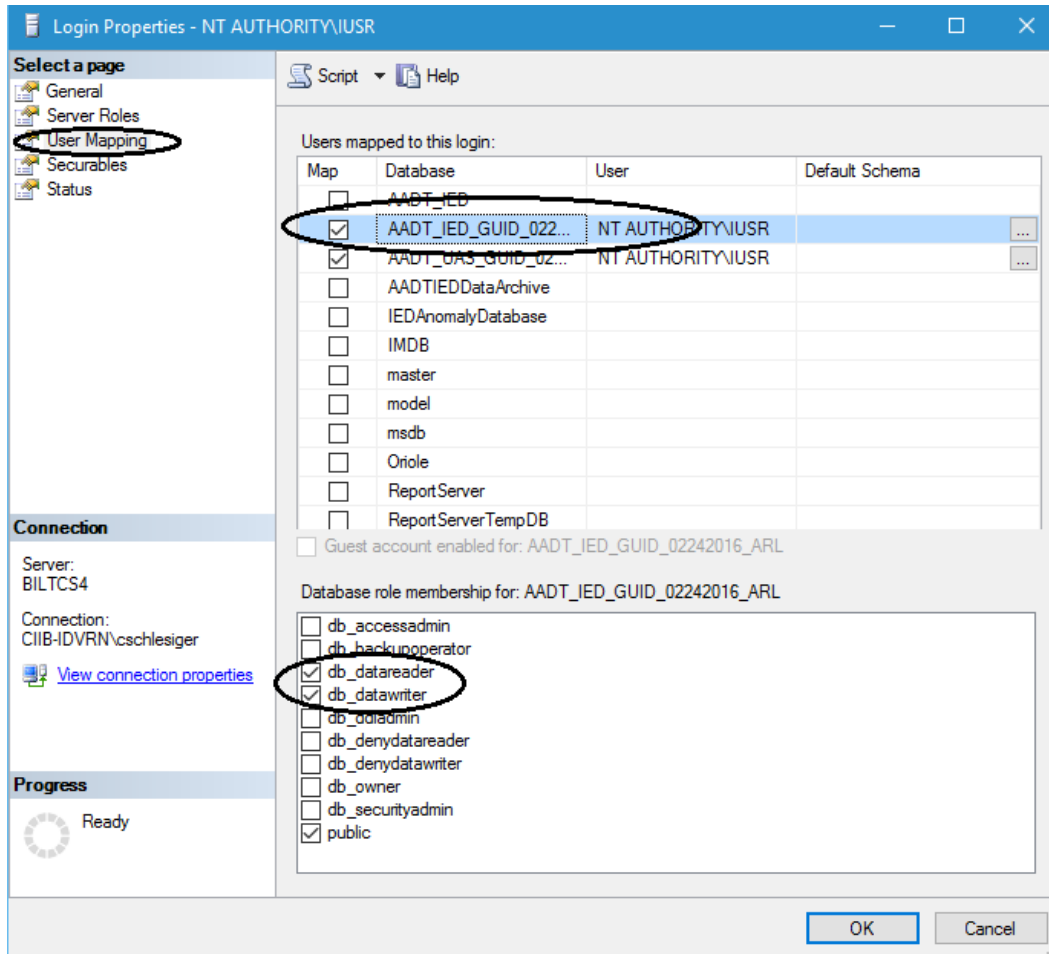


Fig. 26 Setting permissions for the AADT_IED database for IUSR

- 16) Repeat steps 14–15 for “AADT_UAS_GUID_02242016_ARL”.
- 17) Click on **OK** for the “Login Properties” window to apply the changes.
- 18) Exit SQL Server Management Studio.

13. Verify PHP Configuration in IIS

The PHP parser should have installed itself correctly into IIS. However, there is a possibility that some manual configuration is necessary. This section describes how to check the installation and correct the configuration if necessary.

- 1) Open the control panel if it is not already open. Navigate to System and Security->Administrative Tools (Fig. 27).

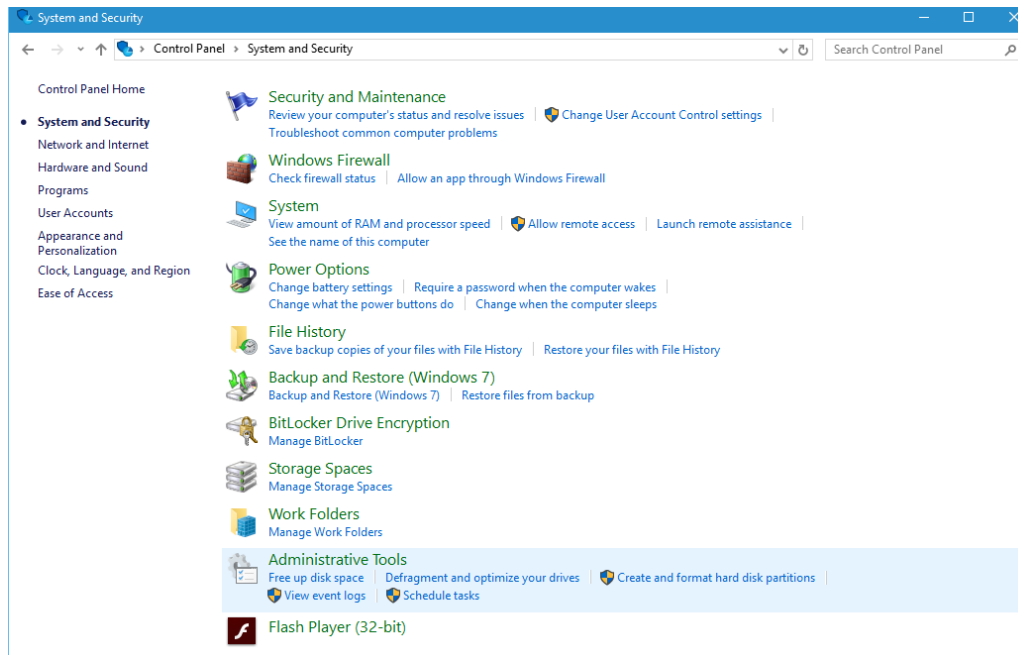


Fig. 27 Control panel Administrative Tools

- 1) A new window opens with the title “Administrative Tools”. On the right pane of the Administrative Tools window, locate “Internet Information Services (IIS) Manager” and double-click it (Fig. 28).

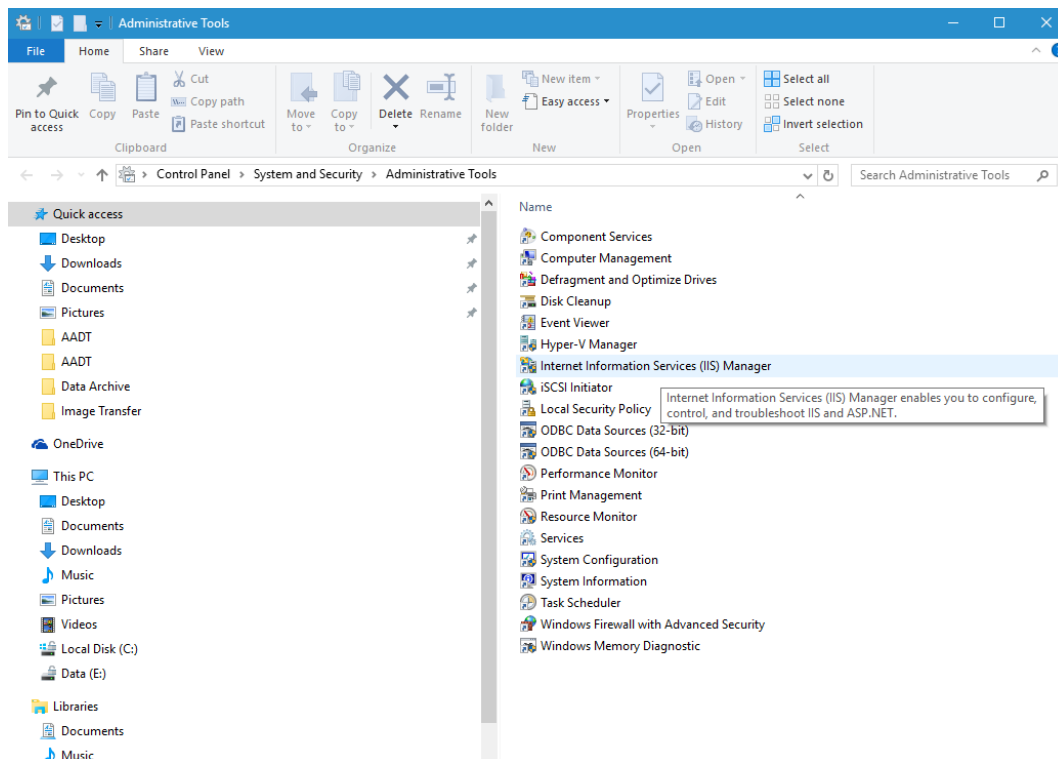


Fig. 28 Administrative Tools location of IIS Manager

- 3) This opens the IIS Manager.
- 4) On the left pane “Connections”, the top-level tree item should be selected which is the computer name. In the middle pane are icons for configuration. This is the main Home panel.
- 5) Locate the “Handler Mappings” icon and double click it (Fig. 29).

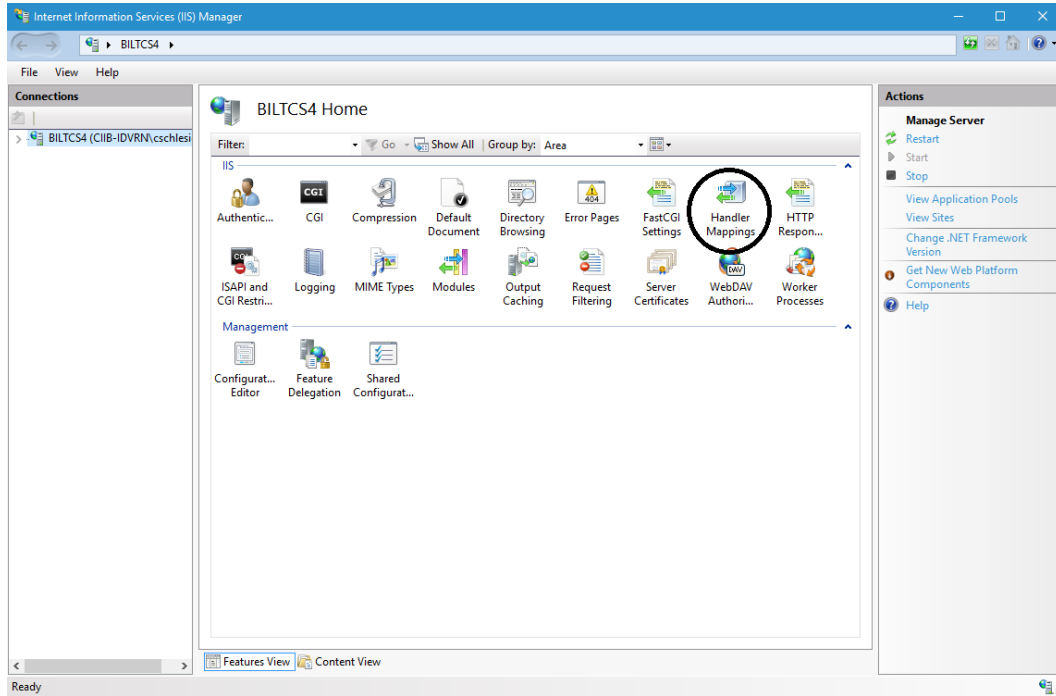


Fig. 29 IIS Manager

- 6) Look for the mapping “PHP_via_FastCGI” under “Enabled”. If it is not there, follow the next steps (Fig. 30). If it is, skip to step 10.

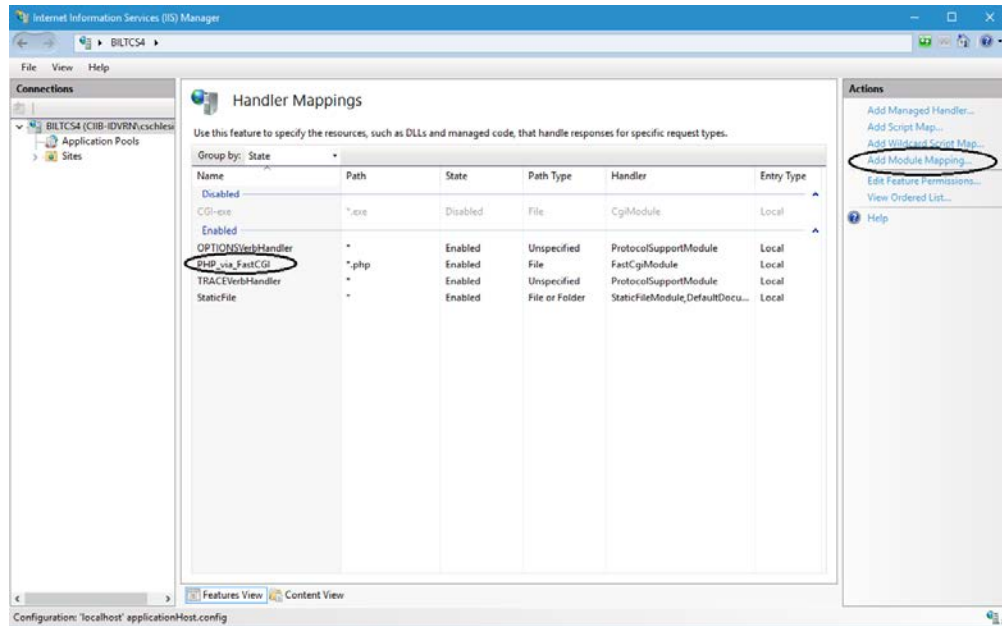


Fig. 30 IIS Manager Handler Mappings

7) On the right pane under “Actions”, click on **Add Module Mapping** (Fig. 30). In the new window that appears, fill it in as follows (Fig. 31):

- Request path: *.php
- Module: FastCgiModule
- Executable (optional): C:\Program Files (x86)\PHP\v5.6\php-cgi.exe
- Name: PHP_via_FastCGI

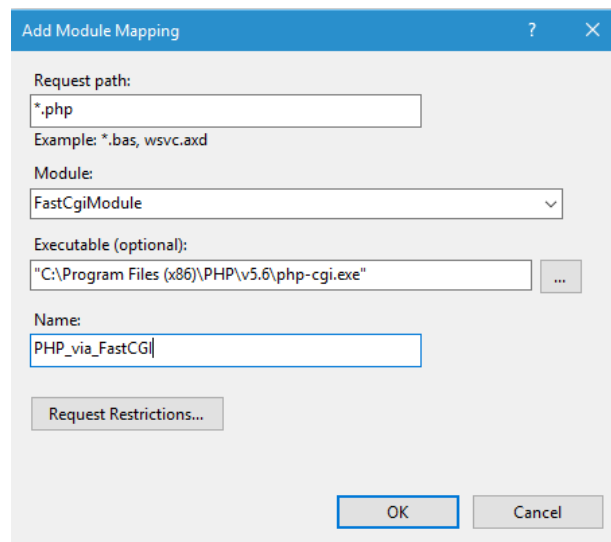


Fig. 31 Add Module Mapping information for PHP_via_FastCGI

- 8) Click on **OK**
- 9) A confirmation dialog window will appear asking to create a FastCGI application for this executable. Click **Yes**.
- 10) In the left pane, click on the top-level tree (the computer name) to return to the Home page and the series of icons in step 3.
- 11) Locate the icon for “Default Document” and double-click it (Fig. 32).

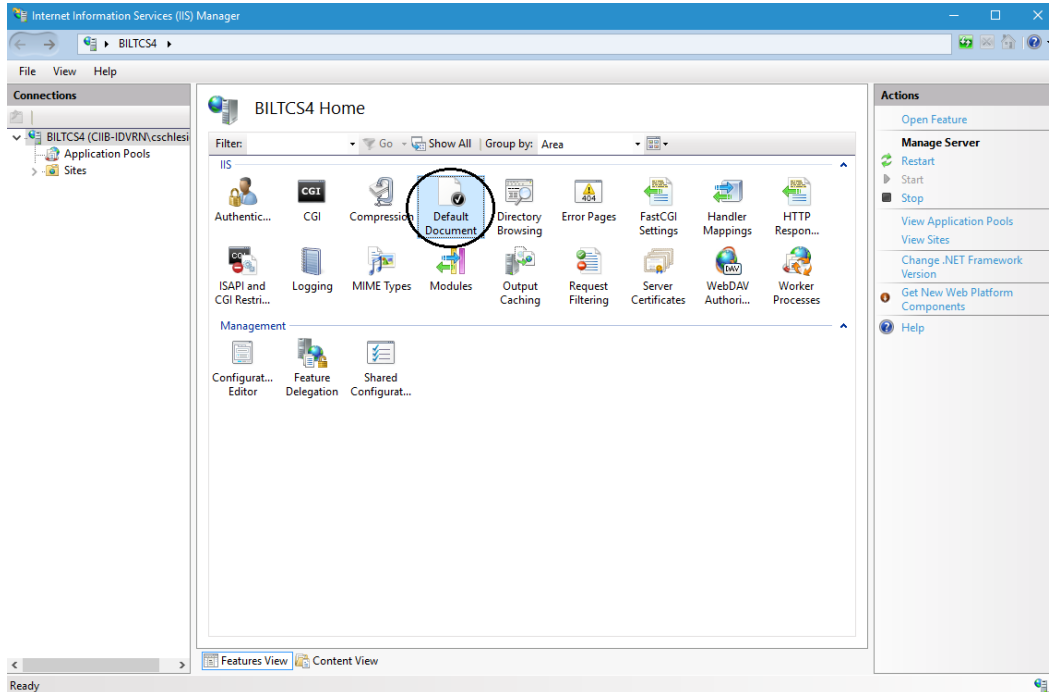


Fig. 32 Internet Information Services Manager Default Document

- 12) Verify that the following 2 are in the list:
 - default.php
 - index.php
- 13) If they are not, click on **Add...** in the right-hand pane under “Actions” (Fig. 33) and add each of these in turn.
- 14) Leave the IIS Manager open for the next sections.

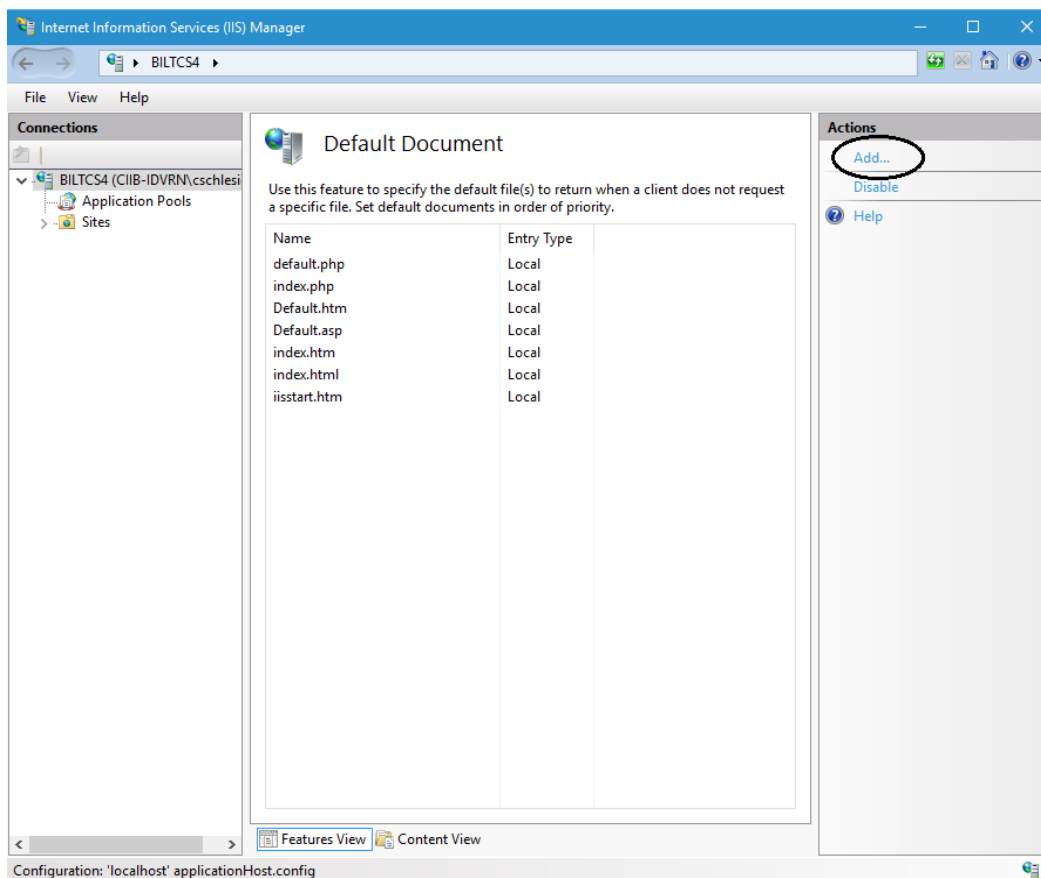


Fig. 33 Adding new Default Documents

14. Copy the IED and UAS Web Site Files

Now it is time to copy over the web site files to the server. In this section, 2 copies of the website files are made. One for use and one for reinstall and recovery.

- 1) Locate the web service folders for the IEDS and UAS applications. They are on the network drive at

```
\\SynologyNAS\root\public\cschlesiger\AADT Web Setup
```

There should be 2 subfolders within this folder:

- ied
- uas

- 2) Copy these folders to the following location, creating the destination as necessary:

```
C:\Application Installs\AADT Web Services
```


- 3) This step creates the actual working web site folders. Copy again the 2 folders “ied” and “uas” from Step 2 from the folder

C:\Application Installs\AADT Web Services

to the following folder, creating it as needed:

C:\inetpub\wwwroot\aadt

15. Add the IEDS and UAS Websites

This section configures IIS to serve up the 2 websites and is the final step to installing the IEDS and UAS applications.

- 1) In the IIS Manager Window, in the left pane “Connections” expand the tree to “Sites” then “Default Web Site”.
- 2) Right-click on “Default Web Site”, on the context menu select “Add Virtual Directory...” (Fig. 34)

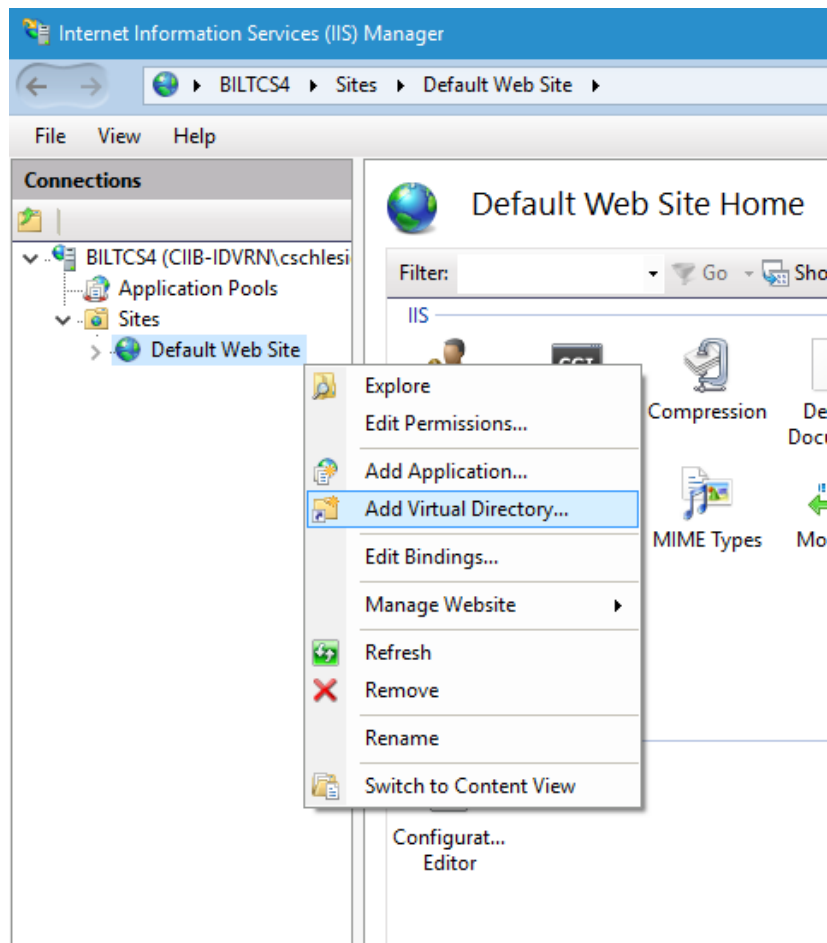


Fig. 34 Creating a Virtual Directory for the Default Web Site

- 3) In the “Add Virtual Directory” window that appears, set the fields as follows (Fig. 35):
 - Alias: aadt
 - Physical path: C:\inetpub\wwwroot\aadt
- 4) Click on **OK**.

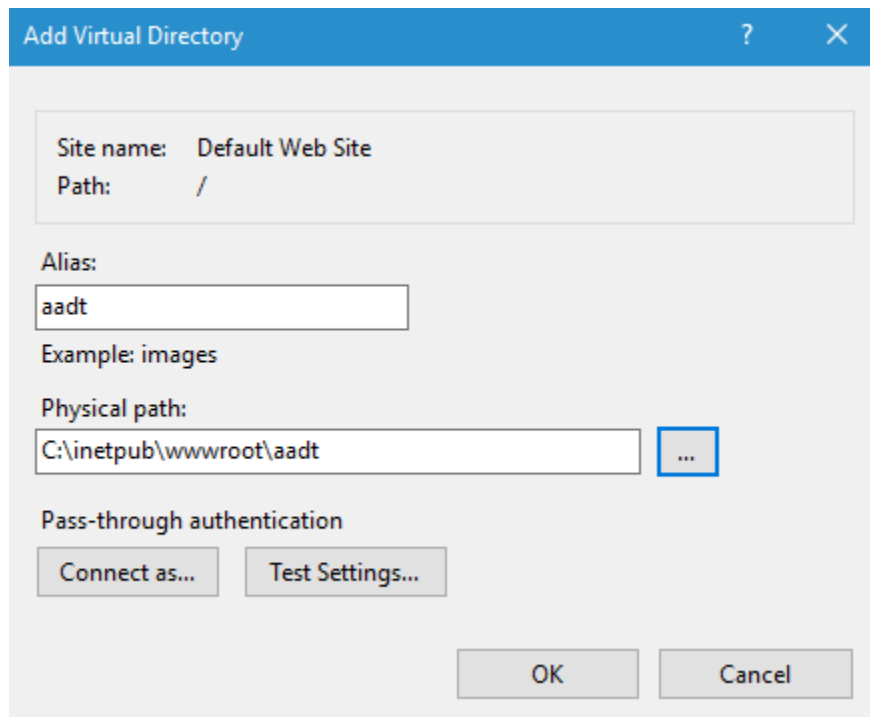


Fig. 35 Adding a Virtual Directory for aadt

- 5) The tree in the left pane should now show “aadt” under “Default Web Site”. When one expands the tree under that, the 2 folders “ied” and “uas” are shown. But they need to be converted to Virtual Directories also.
- 6) Select “aadt” in the tree—*this is important*—then right-click and on the context menu and select “Add Virtual Directory...” (Fig. 36).

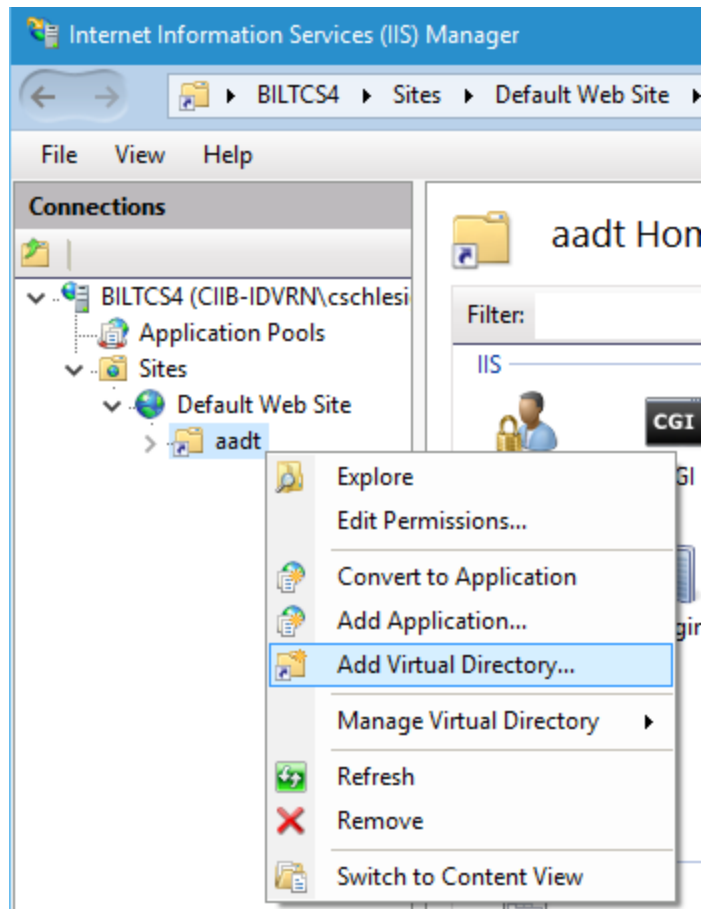


Fig. 36 Adding Virtual Directories under aadt

- 7) In the “Add Virtual Directory” window that appears, set
 - Alias: ied
 - Physical path: C:\inetpub\wwwroot\aadt\ied
- 8) Click on **OK**.
- 9) Repeat steps 6–8, making sure the folder “aadt” is selected in the tree and set the second Virtual Directory as follows:
 - Alias: uas
 - Physical path: C:\inetpub\wwwroot\aadt\uas
- 10) The icons in the tree in the left-hand pane for “ied” and “uas” should have changed from plain yellow folders to yellow folders with a little arrow in the bottom-left corner (Fig. 37).

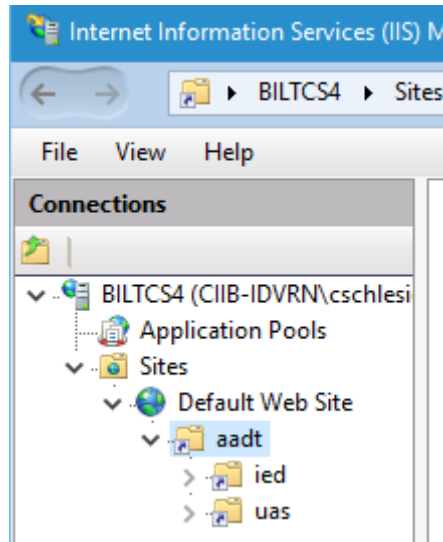


Fig. 37 Complete Virtual Directories for IEDS and UAS websites

11) Close IIS Manager and Administrative Tools.

16. Verify the Web Sites

Now the web applications can be tested and run.

1) Launch a web browser. The following browsers have all been tested to run the application: Microsoft Edge, Microsoft Internet Explorer, Google Chrome, and Mozilla Firefox.

2) To launch the IEDS web application, type the following address in:

<http://localhost/aadt/ied>

3) Confirm that the website launches and that the user can login as a guest and see the training course (Fig. 38).

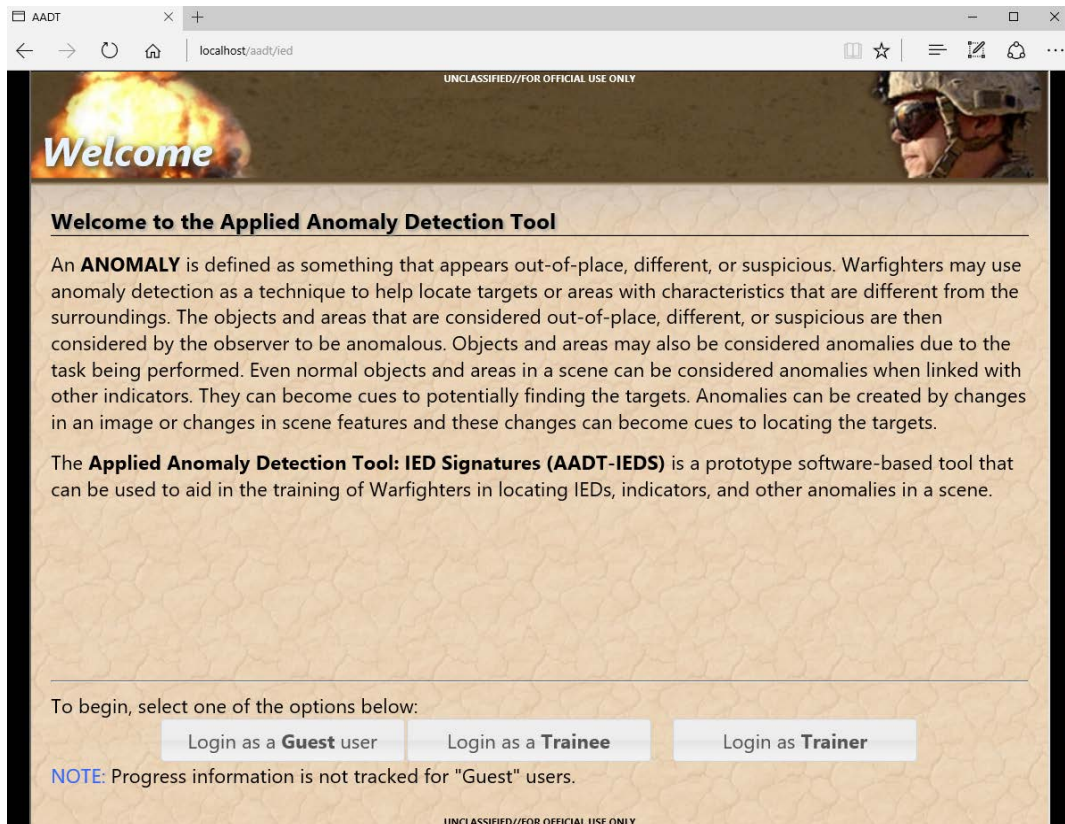


Fig. 38 The AADT IEDS web application start up screen in a web browser

4) Repeat with the address for the UAS application (Fig. 39):

<http://localhost/aadt/uas>

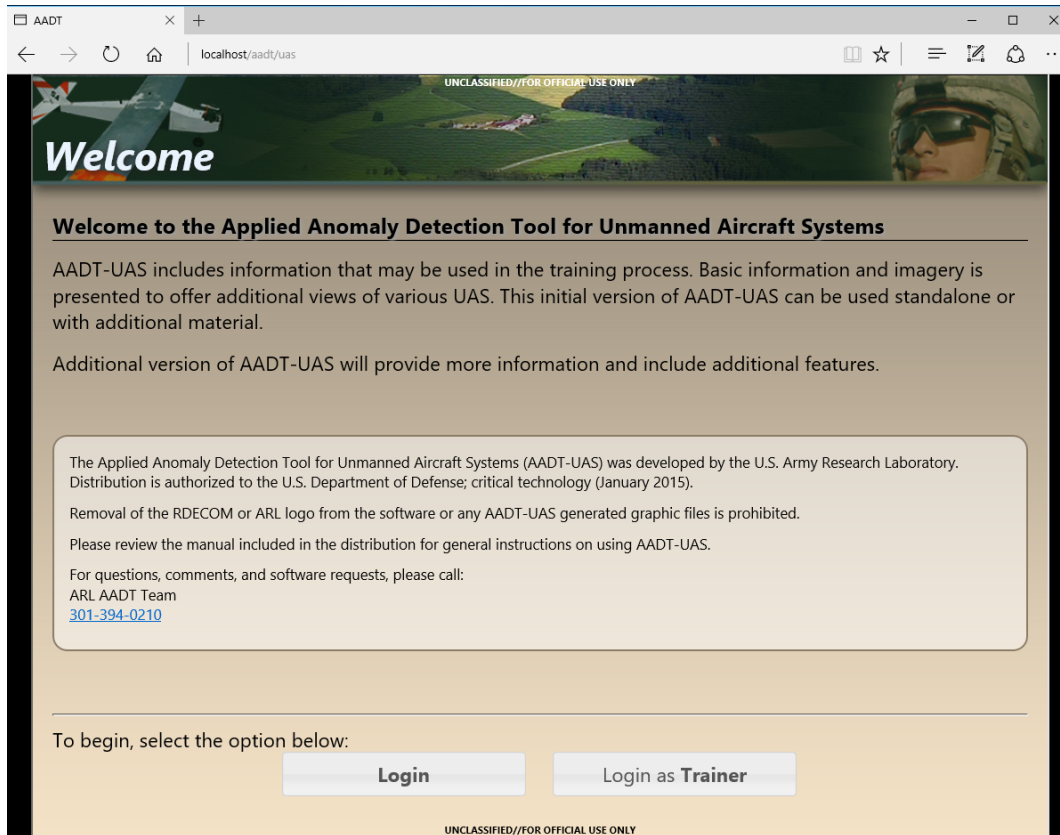


Fig. 39 The AADT UAS web application startup screen in a web browser

17. Allow Network Access

The final step is to allow other computers to have access to this website. To do this, the computer needs to be discoverable on the network. Before proceeding through this section, confirm with the network administrator that changing this setting is permitted.

- 1) Open up the control panel and then go to Network and Internet->Network and Sharing Center (Fig. 40).

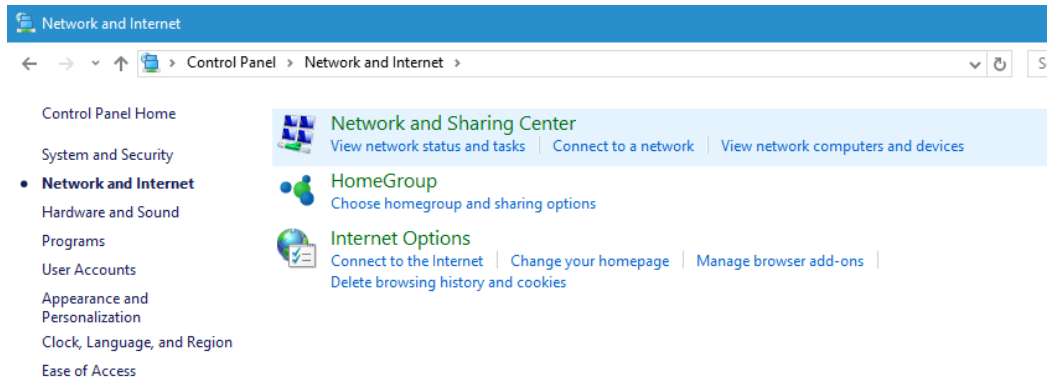


Fig. 40 Control panel navigating to the Network and Sharing Center

2) On the left-hand pane, click on “Change advanced sharing settings” (Fig. 41).

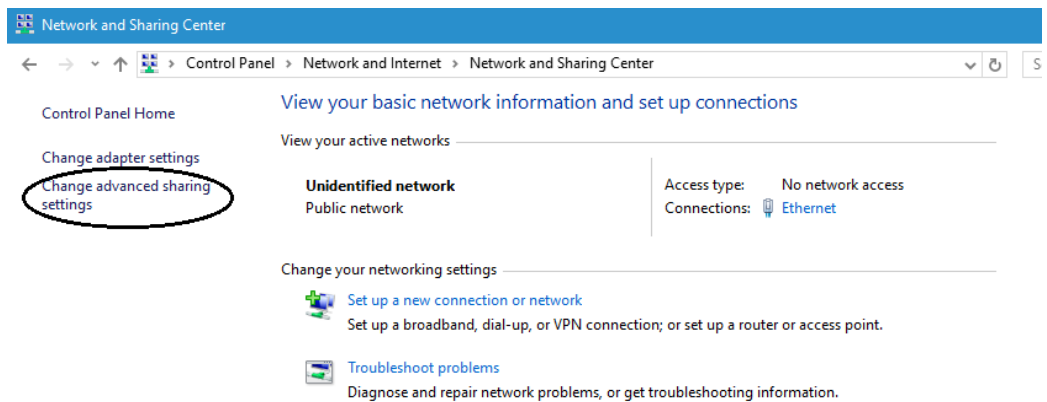


Fig. 41 Control Panel Network and Sharing Center

- 3) On the next window that appears, change the radio button to “Turn on network discovery” (Fig. 42).
- 4) Click on **Save changes**.

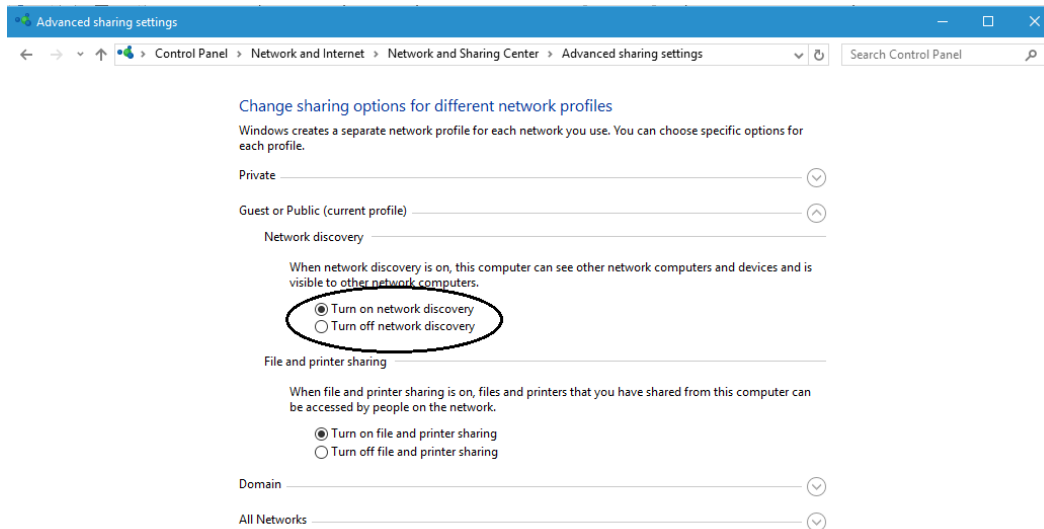


Fig. 42 Turning on network discovery so the server is visible

5) Close the control panel.

18. Final Step

To complete the installation, it is recommended that the server be restarted.

19. Conclusion

This report describes all the steps required to install and configure a new Windows server to run the AADT for 2 applications: IEDS and UAS. At the end of the process, the Windows server is ready to receive connections from a trainer to configure a course, and then from trainees to take that course. Instructions and manuals to use the AADT software itself are not covered in this document, but can be found elsewhere.^{2,3}

20. References

1. Raglin A, Harrison A. The applied anomaly detection tool (AADT): a platform for training warfighters in battlefield assessment scenarios. 21st International Command and Control Research and Technology Symposium (ICCRTS); 2016 Aug. London (UK).
2. Raglin A, Burnette C. AADT trainer trainee manual. Adelphi (MD): US Army Research Laboratory (US); In press.
3. Dawson L, Raglin A, James D. Applied anomaly detection tool – IED signatures (AADT IEDS version 4.0 reference guide). Adelphi (MD): US Army Research Laboratory (US); 2014. Report No.: ARL-TR-7081.

1 DEFENSE TECH INFO CTR
(PDF) DTIC OCA

2 US ARMY RSRCH LAB
(PDF) IMAL HRA MAIL & RECORDS MGMT
RDRL CIO L TECHL LIB

1 GOVT PRNTG OFC
(PDF) A MALHOTRA

1 US ARMY RSRCH LAB
(PDF) RDRL CII B
C SCHLESIGER
ADRIENNE RAGLIN
STEPHEN RUSSELL

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